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ANGLE OF CLEARANCE OF THE LEFT VENTRICLE AS AN INDEX TO CARDIAC SIZE

MODIFIED TECHNIC FOR ITS DETERMINATION AND RANGE OF VALUES FOR NORMAL CHILDREN

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Clinically it is important to detect slight changes in the size and contour of the heart and to try to differentiate between normal and slightly enlarged hearts. Enlargement of the left ventricle occurs frequently with rheumatic heart disease. The present study was undertaken to evaluate one of the quantitative roentgenologic methods used to indicate the size of the left ventricle in children.

Wilson,[1] by determining the degree of rotation necessary to separate the left lower border of the heart (left ventricle) from the vertebral column in fluoroscopic examination in the left anterior oblique position, introduced an index of cardiac size and termed it the angle of clearance. For 97 per cent of 119 normal children ranging in age from 5 to 15 years the angle of clearance was less than 55 degrees; it was between 40 and 55 degrees for 49 per cent, between 45 and 55 degrees for 48 per cent and between 55 and 65 degrees for 3 per cent. Wilson, from her studies, concluded that angles of clearance of 55 degrees or more indicated enlargement of the left ventricle. Fluoroscopic examination in the posterior-anterior position of 119 normal subjects showed the heart to be in the transverse position in 44 per cent of the subjects and in the vertical position in 56 per cent. Hearts that are vertically placed are more likely to have an angle of clearance of 40 to 45 degrees.

Kuttner and Reyersbach,[2] following the method of Wilson, examined 101 healthy girls ranging in age from 7 to 15 years. For 77 per cent of the children the angle of clearance of the left ventricle was less than 55 degrees; for 21 per cent it was 55 degrees, and for less than 1 per cent it was more thran 55 degrees. No definite correlation was found between the angle of clearance and age, body build, height of the diaphragm, position of the heart or state of nutrition. Kuttner and Reyersbach agreed with Wilson that the silhouette of a typically vertically placed heart tends to clear the outline of the vertebral column at a smaller degree of rotation than does that of a transversely placed heart. In view of the number of normal children (21 per cent) for whom the angle of clearance of the left ventricle was 55 degrees, their data suggested that only angles of more than 55 degrees could be considered abnormal. They found that some examinations were unsatisfactory because the children failed to stand properly.

Fluoroscopic examination of the heart in the three standard positions was undertaken in 1941 at the State University of Iowa as part of the routine examination of children with heart disease or suspected heart disease. The examination included the measurement of the angle of clearance as described by Wilson,[1] with the use of a specially made turntable. The only difference between our technic and that of Wilson was that her turntable had fixed points 5 degrees apart. At the various fixed points Wilson viewed the silhouette of the child's heart to obtain the angle at which it cleared that of the spine. The turntable which we used had no fixed points, as we felt that by this means the readings could be obtained more objectively. We rotated the child from the posterior-anterior position (0 degrees) and tabulated the degree of rotation at which the shadow of the heart cleared that of the spine.

Major difficulties soon were encountered in measuring the angle of clearance. We found that the left border of the cardiac silhouette cleared the spinal column at two points: the first, that at which the cardiac border was separated from the projection of the transverse processes of the spinal column, and the second, that at which the cardiac border was separated from the anterior border of the bodies of the vertebrae. There

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2. Kuttner, A. G., and Reyersbach, G.: The Value of Special Radiologic Procedures in Detecting Cardiac Enlargement in Children with Rheumatic Heart Disease, Am. Heart J. **18**:213 (Aug.) 1939.

was a difference of approximately 10 degrees between these two points. Frequently it was difficult to duplicate readings for the same child because of minor changes in position. Wilson [1] cautioned against this source of error, and Kuttner [2] also stated that the examination of some children is unsatisfactory probably as a result of position. We noted that there was a tendency for the children to rotate their bodies from the hip region; so we had them sit rather than stand, to help obviate this source of error.

A new turntable was constructed, which allows the child to sit during the examination (fig. 1). The back rest and the foot rest are adjustable.

The following roentgenoscopic technic has be rigidly adhered to:

1. Examination is done only after adaptati of the eyes to darkness. This necessitates wa ing in the darkened room for ten to fifte minutes or wearing dark goggles for the sam length of time.

2. After the entire chest is examined on th screen, the size of the field is decreased so th only the posterior border of the heart is in vie This procedure facilitates differentiation of th landmarks considerably and also minimizes th exposure of the child to roentgen rays.

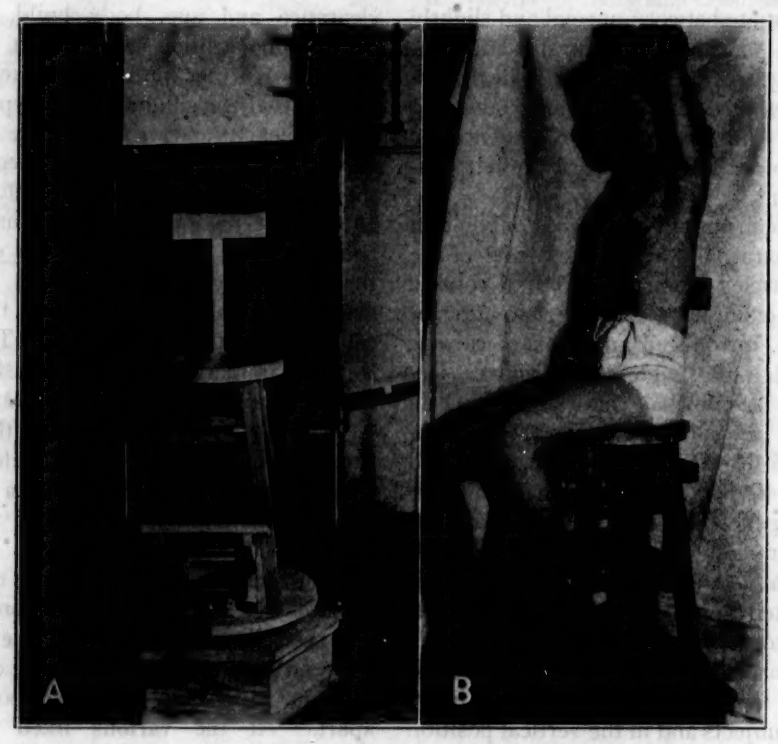

Fig. 1.—*A*, photograph of the modified turntable. The back rest and foot rest are adjustable. *B*, photograph of the turntable rotated to the left anterior oblique position, with the subject sitting in the standardized position.

We place the child on the chair with the arms folded above the head, and he is cautioned to sit erect and motionless. The assistant begins to rotate the chair slowly into the left anterior oblique position while the examiner watches the heart on the fluoroscopic screen. As soon as the posterior border of the heart clears the projection of the transverse processes during normal respiration (fig. 2 *A*), the rotation is stopped and a reading is taken. Then the rotation is continued until the second angle of clearance can be read (fig. 2 *B*).

In addition, the heart is examined in the posteroanterior, right anterior oblique and right lateral positions.

3. The roentgen output of the fluoroscope is measured repeatedly, and special care is taken to reduce the duration of exposure to a minimum. However, we have always observed the heart during both phases of respiration as well as during both cardiac phases.

In order to study the reliability of the angles of clearance, repeated measurements were made for 16 normal children. The number of measurements for each child varied from eight to thirteen. The readings were taken in sets of three or four, and the position was checked but not reestablished for each reading. For this study of reliability no measurement was discarded. From these series of measurements it

s possible to compute a mean angle of clear-
e for each child and to study the deviations
the separate measurements from the mean
ue. The assumption is made that the mean
ue of the repeated measurements of a child
he true angle of clearance.

Table 1 gives for each of 16 children having at
st eight repeated measurements the mean, the

ness. Some of the repeated measurements agreed remarkably well, most of them were satisfactory, some were fair and one series was poor. We found it practically impossible to measure one subject (no. 16) without a period of training. The mean deviation of her measurements was 7.0 degrees and 7.5 degrees for the first and second angles of clearance respectively. This 8

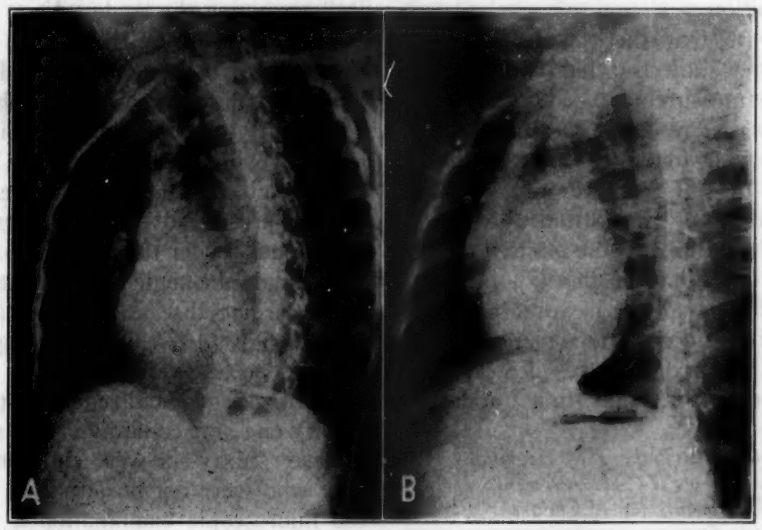

Fig. 2.—Roentgenograms taken with the subject in the left anterior oblique position, *A*, showing the first
gle of clearance, with the posterior border of the cardiac silhouette clearing the projection of the transverse
cesses and *B*, showing the second angle of clearance, with the posterior border of the cardiac silhouette
aring the anterior border of the vertebral bodies.

BLE 1.—*Mean, Standard Deviation, Standard Error of Mean, Mean Deviation and Range of Angles of Clearance for 16 Children*

tient No.	Age, Yr.	Number of Measurements	Mean, Degrees		Standard Deviation, Degrees		Standard Error of Mean, Degrees		Mean Deviation, Degrees		Range, Degrees	
			First Angle	Second Angle	First Angle	Second Angle	First Angle	Second Angle	First Angle	Second Angle	First Angle	Second Angle
1	15	11	60.6	84.9	1.4	3.7	0.4	1.1	1.1	3.0	5	10
2	11	11	57.0	69.8	2.8	2.0	0.8	0.6	2.2	1.5	8	7
3	12	13	42.1	49.7	1.6	1.4	0.4	0.4	1.2	1.2	6	4
4	12	10	43.9	52.4	1.9	2.1	0.6	0.6	1.3	1.7	6	6
5	14	11	52.4	62.6	1.7	2.8	0.5	0.8	1.4	1.8	5	10
6	12	13	53.8	67.2	3.6	4.8	1.0	1.3	3.3	3.9	10	15
7	13	8	56.8	68.9	3.2	3.6	1.1	1.3	2.7	2.9	9	9
8	12	13	58.5	67.8	4.7	4.1	1.3	1.1	3.7	3.0	15	13
9	11	12	65.0	79.8	2.8	2.1	0.8	0.6	2.0	1.8	10	6
10	6	12	51.8	64.5	3.5	2.8	1.0	0.8	3.0	2.3	10	9
11	9	12	50.8	63.6	4.1	4.7	1.2	1.3	3.6	3.8	12	13
12	13	12	54.8	68.8	1.5	1.6	0.4	0.5	1.3	1.3	5	5
13	12	12	51.1	64.6	2.4	3.8	0.7	1.1	1.9	3.3	7	12
14	8	12	54.2	69.2	4.5	4.9	1.3	1.4	3.9	4.3	13	12
15	11	12	52.5	67.3	1.6	1.7	0.5	0.5	1.3	1.3	5	6
16	8	12	53.3	67.0	8.7	10.0	2.5	2.9	7.0	7.5	24	29

ndard deviation, the standard error of the
an, the mean deviation and the range for both
gles of clearance. For 11 children, 69 per
nt of the group, the mean deviation was less
n 3.5 degrees for both angles of clearance; for
children, 94 per cent, the mean deviation was
degrees or less. We were able to measure
angle of clearance of the left ventricle for
se 16 children with varying levels of exact-

year old child, though trying to cooperate, unconsciously rotated her body out of the standard position.

In reviewing eight series each consisting of twelve measurements taken at three different sittings, it was found that a few sets of measurements showed a bias caused by changes in the position of the child. Changes can occur without the examiner being aware of it, and to elim-

inate the resulting bias, the child should be relaxed between the readings; when he again assumes the correct position, it should be rechecked. By following this procedure the chance of a constant error in the repeated measurements resulting from the fact that the subject held the body slightly rotated or inclined is greatly reduced and the mean of the readings gives a better estimate of the true angle of clearance in the standard position.

We were aware that there were individual differences in the subjects which affected the precision of the measurement of the angles of clearness, but we were interested nevertheless in analyzing the data for the group as a whole. The deviations of the separate measurements from the true values for 15 children were pooled (the data for subject no. 16 were omitted). The average of the deviations of the 174 measurements for the first angle of clearance was 2.3 degrees and for the second angle 2.4 degrees. The standard deviations were 1.8 degrees and 2.1 degrees for the first and the second angle of clearance respectively. Judging from these data, not more than 10 per cent of the single measurements vary more than 5 degrees from the true value. Table 2 gives the distribution of the pooled deviations. As stated before, each deviation is the difference between a single measurement of the angle of clearance and the mean of repeated measurements for that child.

TABLE 2.—*Frequency Distributions of Deviations from the True Values of 174 Measurements of Angle of Clearance for 15 Children*

Amount of Deviation (Without Regard to Sign), Degrees	Frequency	
	First Angle	Second Angle
8.5	1	1
7.5	1	3
6.5	2	9
5.5	5	2
4.5	11	14
3.5	18	14
2.5	29	26
1.5	39	32
0.5	43	47
0 to 0.4	25	26

We were able to make a limited study of the agreement of measurements made by two radiologists. At one measuring period two radiologists, each working with his trained assistant, secured six paired readings for each of the angles of clearance. It was found that one of the examiners consistently read the first angle of clearance slightly higher than the other examiner and the second angle slightly lower. The mean values of the six paired readings were 59.1 and 57.5 degrees for the first angle and 75.7 and 78.5 degrees for the second angle of clearance. The difference, of approximately 2.5 degrees, well within the error of the method.

Several factors may influence the precision the measurement of the angle of clearance cause minor or chance errors. These incl (1) slight deviations from the standard positi (2) differences between readings made dur the two phases of respiration and the two pha of the cardiac cycle and (3) exactness and e in determining the landmarks.

It is evident from the data in table 1 that precision of the measurement depends to so extent on differences in the subjects, chiefly (1) ability to cooperate, (2) ability to sense t correct position and hold it, (3) fatigue and (nutritional condition. But unless any of the traits is present adversely in an extreme measu it does not render the examination impracticab

To study the angle of clearance of children fr from cardiac disease, 49 normal boys and normal girls (102 children) ranging in age fro 4 to 19 years were examined. Fifteen of t children were hospitalized for metabolic study a twenty-one for conditions not related to he disease. Sixty-six were children living in Io City who were not hospitalized. At the time the fluoroscopic examination a physical exam nation of the heart was made, a history of t child pertaining to heart disease and infectio of the upper respiratory tract was taken and t height and weight were obtained. On the bas of these data the child was included in or e cluded from the group of children free from ca diac disease. Each of the 102 children w examined fluoroscopically on the new turntab and the two points of clearance were read in t manner previously described. The standard pos tion was established and was watched carefull during the measuring period. At least thr readings of each angle were made for each chil When an obvious error caused a questionab value, the reading was discarded and anoth taken. For this group the precaution of relaxi the child between the measurements was n taken. It was subsequent to the time of the measurements that we discovered the bias in re peated measurements caused by changes in pos tion. The final value recorded for the chil as the angle of clearance of the left ventricle w the mean value for three measurements.

Before making a statistical analysis of the da we felt we should endeavor to check the extrem values obtained. There were 8 children fo whom a first angle over 60 degrees had bee recorded. It was possible for 4 of these childre to return for a recheck. The angles on reche were all relatively high, but measurements fo 3 of the children were lowered 2 to 7 degre

d that for the fourth was increased 2 degrees. e highest value obtained was 63 degrees for e first angle and 86 degrees for the second gle. For 2 children angles of clearance of s than 40 degrees were recorded. One child uld return for a recheck; her second measure- nt still was relatively low, but it was raised degrees for the first angle and 11 degrees for e second angle. There must have been an ror in position during the first examination this child.

Table 3 shows the frequency distributions of th of the angles of clearance for 102 normal

3.—*Frequency Distribution of Angles of Clearance for 102 Normal Children*

gle of Clearance, Degrees	Frequency	
	First Angle	Second Angle
85	..	3
80	..	2
75	..	1
70	..	12
65	2	22
60	10	34
55	18	21
50	45	6
45	17	1
40	9	..
35 to 39	1	..

BLE 4.—*Mean and Standard Deviation of Angles of Clearance for Normal Boys, for Normal Girls and for Normal Group as a Whole*

	First Angle of Clearance			Second Angle of Clearance		
	Number	Mean, Degrees	Standard Deviation, Degrees	Number	Mean, Degrees	Standard Deviation, Degrees
oys	49	51.4	6.0	49	63.1	7.0
irls	53	52.2	5.3	53	63.2	8.4
Whole group	102	51.8	5.8	102	63.2	7.4

ildren. The range for the first angle of clear- nce was from 38 to 67 and for the second from 6 to 86. The mean value for the first angle clearance (table 4) was 51.8 degrees and for e second 63.2 degrees. The standard devia- ons were 5.8 and 7.4 degrees respectively.[3]

The difference between the means of the first nd second angles of clearance for the 102 nor-

3. The data for normal children were tested statistically for differences in the means of the angles of clearance for age groups and for sex groups. The slight differences are all well within the limits allowable for chance errors. The means for the angles for the groups according to sex are given in table 4. The mean values for the first and second angles for three age groups are: for 4 to 8 years inclusive, 51.9 and 63.8; for 9 to 11 years inclusive, 52.4 and 63.2, and for 12 to 19 years inclusive, 51.5 and 62.8 degrees.

mal children was 11.4 degrees. There is a high correlation between the first and second angle, and therefore when both are determined they serve as a check on each other.

Our data confirm the observation of Wilson and Kuttner that vertically placed hearts have a lower angle of clearance than transversely placed hearts.

The values for the first angle of clearance were distributed according to build. The data for the subgroups, however, were not sufficient to permit any conclusions. The mean angle of clearance for 33 children who were of average height for their age and average weight for height and age was 52.7 degrees. There was a tendency for fat children to have greater angles of clearance. The mean value for 4 short, fat children was 54 degrees and for 6 fat children of average height 59.3 degrees.

COMMENT

To use effectively any quantitative method to detect slight changes in the size of the heart which occur with rheumatic or other heart disease it is necessary to know the reliability of the method used and the range of normal values. Fluoroscopic examination of the chest is a relatively inexpensive procedure provided the equipment is available. If the angle of clearance of the left ventricle can be measured accurately, a quantitative value for future reference is provided. When the physician uses quantitative values, it is important that he follow a standardized technic.

We followed the principles described by Wilson [1] and by Kuttner and her associates [2] but altered the method of examination slightly. We found that the new turntable on which subjects are examined while seated allowed less change in position during examination than was observed when the child had to stand. We also found that two points of clearance of the posterior border of the cadiac shadow are easily seen, but also that they might easily be confused. There appears to be a greater difference of contrast between the projection of the transverse process and the surrounding structures than between the anterior border of the vertebra and the neighboring tissues. This appears to facilitate the first reading and therefore to make it more accurate, as is borne out by the smaller range of deviation for that angle.

Inasmuch as we have modified the technic as described by Wilson, our data would not be comparable with those reported by her and by Kuttner. We found wide variation in the angles of clearance for normal children, and we believe that no fixed point should be set below which the readings are considered normal and above which

abnormal. In our opinion it is important to evaluate a subject's angle of clearance in relation to his own repeated measurements as well as in relation to the range of normal values. A reading that is within the normal range might represent an enlarged heart for one child, while it represented a normal heart for another child.

At the present time we are studying the clinical application of the technic described. Frequently a clinician must decide whether a child has cardiac damage or whether active rheumatic heart disease is present. Two of the most helpful signs in making these decisions are the size and the contour of the heart. If the reading for a child with suspected heart disease is within the lower range of the normal values, it is likely that there is no enlargement. If a child has rheumatic fever, one would expect a higher angle of clearance during the active phase of the disease and a gradual decrease of the angle as the patient's condition improves. Repeated examinations showing no significant changes constitute confirmatory evidence that the disease is in the inactive stage. If the angle of clearance remains high, undoubtedly it reflects residual cardiac damage. Conversely, if the angle decreases to a low value it indicates that there is minimal or no enlargement of the left ventricle. If repeated examinations of a child who has had rheumatic fever show no significant change in the readings, the assumption that the disease has remained in the inactive stage receives confirmation.

SUMMARY AND CONCLUSIONS

(1) A modified technic was established for determining the amount of rotation of the subject necessary to make the left lower border of the cardiac silhouette (left ventricle) clear the projection of the transverse processes of the spinal column (the first angle of clearance) and the left lower border of the cardiac silhouette clear the anterior border of the bodies of the vertebrae (the second angle of clearance) by fluoroscopic examination.

(2) Judging from data obtained by repeated examination to establish the reliability of the method, not more than 10 per cent of the single measurements vary more than 5 degrees from the true value for the subject. For 11 of the 16 children for whom repeated measurements were made, the mean deviation from the true value was less than 3.5 degrees for both angles of clearance.

(3) For 102 normal children examined to determine the normal values, the values for the first angle of clearance ranged from 38 to 67 degrees and for the second angle, from 46 to 80 degrees. The mean value for the first angle of clearance was 51.8 degrees and for the second angle of clearance, 63.2 degrees. The standard deviations were 5.8 and 7.4 degrees respectively. Children with vertically placed hearts showed clearance at a smaller angle than children with transversely placed hearts. There are no significant differences in the angle of clearance of the left ventricle in relation to age or sex. Stocky children tend to have greater than average angles of clearance.

(4) It is our belief that fluoroscopic examination to determine the angles of clearance of the left ventricle is valuable as a supplementary means of studying the heart if the examination can be repeated and the results of subsequent examinations can be compared. Any significant change from the original values could then be interpreted as a change in the size of the heart.

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AN UNUSUAL OUTBREAK OF MUMPS

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Interest in the control of mumps is usually ightened during wars because of the prevalence the disease among troops [1] and the consequent nger of outbreaks in crowded civilian groups.

Control based on isolation of patients and uarantine of exposed persons is often ineffective, rgely because the infection is highly communi- ble before the onset of symptoms and the recog- tion of the disease.[2]

Efforts to prevent infection by increasing the sistance of susceptible persons have been limited passive immunization with convalescent blood serum.[3] The results of such measures have aried greatly. Although many investigators ve reported protection of all or almost all of e persons inoculated,[4] some have had a suf- iently large percentage of failures to introduce oubt as to the prophylactic value of the pro- dures employed.[5] These differences are not easily explained.[6] They reflect the existence of variables which make interpretation of the results of clinical studies difficult.

An unusual institutional outbreak of mumps revealed the extent to which uncontrolled conditions may vary and showed the need for adequately chosen controls in evaluating clinical data on prophylaxis. The outbreak occurred at Letchworth Village, a New York State institution for feebleminded persons. It developed among boys residing in eight cottages (A, B, C, D, E, F, G and H). Each cottage housed 80 to 90 inmates and 8 employees. Cottages A and F had mainly adolescent boys and young adults who were engaged in various occupations throughout the institution. Cottages B, C, D and E were occupied mainly by children of school age who intermingled each day except Saturday and Sunday in classrooms and workshops. Cottages G and H housed inmates of low grade intelligence who were confined to their respective cottages or were allowed limited activities out of doors. The inmates of cottages A, B, C and D used one common dining room, and those of E, F, G and H, another.

The number of inmates susceptible to mumps was unknown. None had been previously exposed to the disease at the institution. With few exceptions they were from urban areas, and about 85 per cent of them were from New York city. They were comparable physically to the general population. The age distribution of the inmates by cottages is shown in table 1.

There was close contact between persons who were inmates in the same cottage. They lived together like one family. The sleeping quarters in each cottage were limited to two dormitories,

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each with about forty beds, arranged in three rows, with about 12 inches (30 cm.) of space between adjacent beds and 5 feet (150 cm.) between the rows.

Newly admitted inmates were confined to their respective cottages for the first few days except at meal times, when they were in contact with inmates of other cottages using the same dining room.

Mumps was introduced into the group by an inmate who entered the institution during the incubation period. He was admitted on March 8 at 11 a. m. and was sent at once to cottage B, where he remained for twenty-four hours. On March 9 at about 10:30 a. m. he was transferred to cottage E. That evening, about ten hours after admission to cottage E, he complained of earache. Enlargement of the glands was not noticed at this time. The following morning

TABLE 1.—*Age Distribution of the Inmates by Cottages*

Cottage	Total Number of Inmates	Age, Years			
		4 to 9	10 to 14	15 to 19	20 and Over
A	84	0	0	43	41
B	85	37	38	4	6
C	81	1	51	24	5
D	80	1	42	34	3
E	88	6	67	11	4
F	88	1	10	67	10
G	86	0	29	54	3
H	85	23	41	12	9
Total	677	69	278	249	81

(March 10), after he had been in cottage E for twenty-four hours, swelling of the left parotid gland was evident and a diagnosis of mumps was made. He was put to bed in his dormitory and remained in cottage E during his entire illness.

Since there had been no cases of mumps at the institution for a few years, an extensive outbreak was expected. Therefore a question arose as to the advisability of employing convalescent serum in an effort to protect the exposed inmates, particularly those in cottage E, where the infected patient was staying. It was decided not to use serum because the amount available was not sufficient for all the inmates, or even for half of those in cottage E if a controlled test of its efficacy was planned.

Twenty-one secondary cases of mumps occurred from March 25 to April 4, 20 in cottage B, where the infected patient had stayed for twenty-four hours shortly before the onset of his symptoms, and 1 in cottage D as a result of exposure in the dining room. During this period no secondary cases occurred in cottage E, where many were expected because the inmates were exposed to the first patient shortly before the onset of symptoms and throughout the illness.

The date of onset of symptoms and the leng of the incubation period for the 21 seconda cases are shown in table 2.

After the inmates had been exposed to t secondarily infected patients, 21 additional ca occurred between April 11 and April 22. T dates of onset for the new cases and the distr bution by cottages are shown in table 3.

TABLE 2.—*Date of Onset and Incubation Period f Twenty-One Secondary Cases*

Date of Onset	Incubation Period, Days	Number Cases
3/25	16 - 17	1
3/26	17 - 18	0
3/27	18 - 19	5
3/28	19 - 20	4*
3/29	20 - 21	3
3/30	21 - 22	0
3/31	22 - 23	4
4/ 1	23 - 24	2
4/ 2	24 - 25	1
4/ 3	25 - 26	0
4/ 4	26 - 27	1
Total	16 - 27	21

* One case in cottage D, all others in cottage B.

TABLE 3.—*Dates of Onset of New Cases and Distribution by Cottages*

Date of Onset	Number of Cases	Cottag
4/11	1	B
4/12	2*	B
4/13	4*	B
4/14	1	B
4/15	1	D
4/16	1	D
4/17	1	D
4/18	3	C
4/19	4	C, D†
4/20	1*	C
4/21	1	D
4/22	1	D

* Includes a case in which the patient was an attendant.
† Two cases in cottage C and 2 cases in cottage D.

The first 8 cases of the second wave of the ep demic occurred between April 11 and April in cottage B, where there was intimate exposu to 20 patients; the next 3 developed betwe April 15 and April 17 in cottage D, where th was exposure to 1 patient, and the last 10 c curred in cottages D and C, whose inmates us the same dining room and school. No ca occurred in cottage E, despite exposure of t inmates at school and in the workshops.

After April 22, there were only 2 new cas One occurred in cottage E; it was the first occur there since the primary case was discover The date of onset for this case was May 2 a for the other, May 9. The last patient was attendant in cottage C.

A summary of the development of second cases and the cottages in which they occurred presented in table 4.

Forty inmates and 4 employees in cottages C, D and E had mumps during the epidemic. ly 1 person in cottage E acquired the disease, ward the end of the outbreak, even though its upants had been in contact with primary and ondary sources of the infection in various ges of the disease.

The age-specific rates for cottages B, C, D d E combined are shown in table 5.

BLE 4.—*Dates of Onset for Secondary Cases and Distribution by Cottages*

Date of Onset	Number of Cases	Distribution of Cases by Cottages			
		B	C	D	E
3/25 to 4/ 4	21	20	0	1	0
4/11 to 4/22	21(3)*	8(2)	6(1)	7	0
5/ 2 to 5/ 9	2(1)	0	1(1)	0	1
Total.....	44(4)	28(2)	7(2)	8	1

* Figures in parentheses indicate the number of cases in ich the patient was an employee.

TABLE 5.—*Age-Specific Rates for Cottages B, C, D and E Combined*

ge, Yr.	Number of Inmates Exposed	Inmates with Mumps	
		Number	Per Cent
der 10.....	45	11	24.4
to 14.....	198	26	13.1
to 19.....	73	3	4.1
to 29.....	18	0	0.0
Total.....	334	40	12.0

TABLE 6.—*Comparison of Observed and Expected Incidences of Mumps in Cottage E*

ge of mates, Yr.	Number of Inmates in Cottage E	Number of Inmates with Mumps	
		Expected	Observed
der 10.....	6	1.5	0
to 14.....	67	8.8	1
to 19.....	11	0.5	0
to 29.....	4	0.0	0
Total.....	88	10.8	1
Per cent.....	..	12.3	1.1

If the same rates applied to the inmates cottage E, a greater number of patients than t observed would be expected there (table 6). e expected incidence was 11 times greater n the observed incidence.

The difference between the observed and the pected incidence of mumps in cottage E is reased if the age-specific rates for cottage B, here the first patient stayed for twenty-four urs prior to his transfer to E, are applied. e incidence attributable to direct exposure the first patient alone is shown in table 7. many as 24 (26.8 per cent) secondary cases mumps were to be expected in cottage E if the conditions in E were the same as those B.

The number of expected cases is increased to 31 if those resulting from exposure to secondarily infected patients in B are included, as shown in table 8. On this basis the number of cases expected in cottage E was 31 times greater than the number observed.

Data on the incidence of various contagious diseases of childhood were obtained during the ensuing year during outbreaks of measles, rubella, whooping cough and chickenpox at the institution.[7] The incidence of these diseases and of mumps in cottages B, C, D and E are shown in table 9.

TABLE 7.—*Incidence of Mumps Attributable to Direct Exposure to the First Patient*

Age Group, Yr.	Cottage B			Cottage E		
	Inmates	Inmates with Mumps		Inmates	Inmates with Mumps	
		No.	Per Cent		Expected	Observed
Under 10	37	8	21.6	6	1.3	0
10 to 19	42	12	28.6	78	22.3	0
20 to 29	6	0	0.0	4	0.0	0
Total	85	20	23.5	88	23.6	0
Per cent.....					26.8	

TABLE 8.—*Incidence of Mumps in Cottage B and Expected and Observed Incidences in Cottage E*

Age Group, Yr.	Cottage B			Cottage E		
	Number of Inmates	Inmates with Mumps		Number of Inmates	Inmates with Mumps	
		No.	Per Cent		Expected	Observed
Under 10	37	10	27.0	6	1.6	0
10 to 19	42	16	38.1	78	29.7	1
20 to 29	6	0	0.0	4	0.0	0
Total	85	26	30.6	88	31.3	1
Per cent.....					35.6	1.1

Rates were uniformly highest for cottage B and next highest for E, with the exception of mumps, for which the rate was lowest for E. On the whole, the rates for E were well above the average for measles, rubella and chickenpox and almost average for whooping cough. On this basis, the incidence of mumps in E would be expected to be equal to or somewhat above average instead of significantly below average.

COMMENT

An outbreak of mumps has been described in which the incidence of the disease in four cottages (B, C, D and E) ranged from 1 per

7. The epidemics considered in the present report occurred on the following dates: Mumps, 3/25/40 to 5/9/40; chickenpox, 9/7/40 to 2/6/41; whooping cough, 10/20/40 to 11/24/40; measles, 2/28/41 to 3/26/41, and rubella, 5/13/41 to 6/14/41.

cent to 31 per cent. It was lowest in cottage E, in which many cases were expected because the 88 inmates had been intimately exposed to patients in various stages of the disease and because of the relatively high incidence of other contagious diseases of childhood exhibited in the group. Actually no case occurred there until eight weeks after the primary exposure, and then only 1 occurred. Depending on the method of calculation, the number of cases expected in cottage E was from 11 to 31 times greater than the number observed. If these results had been obtained after the use of convalescent serum in cottage E, they might have been presented as clearcut evidence of perfect prophylaxis. The single occurrence eight weeks after the onset of exposure might have been attributed to the return of susceptibility in a passively immunized child. In addition, data obtained during epidemics of other communicable diseases that of clinical infections failed to occur. This mi occur in a disease like mumps, with a short pe of infectiousness which reaches its height ab twenty-four hours before the onset of sympto Under such conditions the affected child mi infect in high degree a host of persons wit the last twenty-four hours before clinical sy toms appeared and become relatively innocu shortly after that.

While this explanation seems plausible for occurrence of many secondary cases in cottag and the absence of secondary cases in cottag after exposure of the inmates to the first pati it does not explain the lack of clinical infecti despite repeated contact with secondarily fected inmates in all stages of the disease. D ing the later stage of the epidemic there probably considerable exposure to the infect agent. Yet only one clinical infection develo in an inmate of cottage E. It therefore see

TABLE 9.—*Incidences of Various Contagious Diseases for Cottages B, C, D and E*

Cottage	Population	Measles		Rubella		Whooping Cough		Chickenpox		Mumps	
		Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per C
B	85	40	47.1	20	23.5	22	25.9	6	7.1	26	30.
C	81	10	12.3	4	4.9	2	2.5	0	0.0	5	6.
D	80	3	3.8	0	0.0	1	1.3	1	1.3	8	10.
E	88	20	22.7	13	14.8	6	6.8	4	4.5	1	1.
Total	334	73	16.7	37	8.5	31	7.1	11	2.5	40	9.

occurred during the year might have been used to support the evidence that the children in cottage E were "protected" against mumps, because it was only for this disease that the incidence in cottage E was significantly lower than the average. Only the use of controls in cottage E would have indicated that either no cases or only 1 should have been expected there under the prevailing conditions. The use of any other controls, such as persons in a different cottage, as for example cottage B, would have been misleading, even though the children lived at the same institution under comparable conditions.

The unexpectedly low incidence of mumps in cottage E was due to some anomalous condition there, either in the degree of exposure to the infection or in the number of susceptible persons in the group. If one considers the incidence of the communicable diseases of which epidemics occurred shortly after the outbreak of mumps and the randomness in the distribution of children among the various cottages, it seems highly improbable that there were few susceptible persons in cottage E. It seems more likely that the susceptible children were inadequately exposed and that therefore the expected number that either there were fewer susceptible childr in cottage E than expected or that the susc tible children there were naturally protected some undetermined way. Such protection co be induced by subclinical infections caused by posure to the first patient after he was tra ferred to cottage E, at a time when his infectio ness was low. The long incubation period wo allow sufficient time for immunologic chan to occur. The degree of immunity arising fr subclinical infection during the early part of epidemic would be sufficient to protect agai clinical infection from intimate contact with fected persons later on. The role of inappar infection in protecting susceptible persons agai bacterial and virus diseases is widely accept In mumps this form of "symptomless immu zation" [9] has been experimentally produced the inoculation of "small quantities of virus"

8. (*a*) Footnote 2. (*b*) Gordon, J. E., and Hee R. H.: The Epidemiology of Mumps, Am. J. M. **200**:412-428 (Sept.) 1940.

9. Topley, W. W. C., and Wilson, G. S.: Principles of Bacteriology and Immunity, ed. 2, Lond Edward Arnold & Co., 1936.

caca rhesus.[5d] Its occurrence in man is likely, ce a large part of the population in endemic as never acquires the disease and about 50 cent of persons with no history of mumps e complement-fixing antibodies and positive aneous reactions indicative of past infection.[10] However one interprets the unusual data in article, the record of what happened when mps was introduced into Letchworth Village nonstrates the extent to which the disease can disseminated before its recognition and the falls of a clinical investigation that is inadetely controlled or dependent on a single trial.

0. (*a*) Enders, J. F., and Cohen, S.: Detection of tibody by Complement-Fixation in Sera of Man and nkey Convalescent from Mumps, Proc. Soc. Exper. l. & Med. **50**:180-184 (May) 1942. (*b*) Enders, J. Observation on Immunity in Mumps, Ann. Int. d. **18**:1015-1019 (June) 1943.

SUMMARY

In an outbreak of mumps at an institution the incidence of the disease in one cottage was significantly lower than would be expected on the basis of the incidence in other cottages and in epidemics of other contagious diseases. The experience illustrates how a single trial of a prophylactic measure may be erroneously interpreted in the absence of adequate controls.

NOTE.—After the 1940 epidemic herein described, no new cases of mumps were observed at the institution until July 16, 1944, when a second outbreak occurred. It affected 11 inmates, 8 in cottage B, and 1 each in cottages C, D and E. Since all who acquired the disease were admitted to the institution after the 1940 epidemic, the indications are that the persons exposed in 1940 are now immune.

Foot of East Fifteenth Street.

SIGNIFICANCE OF A COMPLETE PREVENTIVE MEDICAL PROGRAM FOR CHILDREN

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ROCHESTER, MINN.

A former public health official from an occupied country in Europe said to me the other day: "We have been educating for this war for forty years! The way we have cared for our babies and young children has encouraged the kind of personality that makes violent conflicts inevitable." "Types like Hitler and Mussolini," he went on, "must be expected to develop when we deny to children the secure personal background necessary for normal growth."

This physician was greatly impressed with the possibilities for human development that might be offered by a community medical program which would take into account, from the first days of a child's life, not only his physical health and welfare but his basic emotional needs as well. This is the kind of program to which the Rochester Child Health Project looks forward.

DEVELOPMENT OF PEDIATRIC THOUGHT

Before going into the plan I should like to digress for a few minutes to sketch the background of this project. Pediatricians are responsible for some of the lacks and failures in the field of child care today, as well as for its evident successes. Therefore, a review of pediatric thought since its beginnings, about fifty years ago, may help toward an understanding of how interest in this more comprehensive type of program arose.

This medical specialty started as a separate division devoted to "diseases of children," and was made necessary by the alarming mortality among infants during the late eighteen hundreds. Diphtheria, tuberculosis, intestinal disorders, infectious disease and contamination of milk and water supplies were acute problems which had to be solved, since at that time mortality statistics indicated the death of about 1 of every 4 babies in the first year of life. The effort to improve this situation furnishes one of the bright chapters of medical history, and the scientific management of the children built up for this branch of medicine a well deserved prestige.

As time went on, this supposedly health-bringing program for the care of children grew to be in many cases a meticulous and burde some regimen. Medical ideas were learned that time by study in Austria and Germa routines planned with continental efficie gradually became rigid schedules that had li relation to the reality of a growing child.

Only a few years ago exacting schedules w being imposed on mothers and children, and t aftermath still persists. Formulas calculated the ounce were prescribed, and mothers were couraged not to "give in" to their babies—to them cry it out if the clock had not yet reach the proper hour for feeding or bath. The havioristic psychologists made matters worse their theory that fondling, rocking or singing a child spoiled him—that the mother who voted herself to such softening measures wou make her son a mamma's boy and a sissy. the natural motherly emotions were taboo along with grandmother's rocking chair. In t name of science a long step was taken again nature's laws.

But science is really an attempt to interpr nature. When the spirit became lost in the le ter of the law, science became unscientific a the children suffered, not in the old way but in new way—through disturbances of behavior a failure to conform to the arbitrary daily stan ards set up for them. Problems of feeding, slee ing and elimination multiplied, and tantrum flourished, in spite of the best intentions physicians and parents.

All this would not have happened had pedi tricians known what they know today about no mal growth and development. But unfortu nately the results of scientific research do not a come at the same time. Physicians have to a in the light of what they know today, not in t light of what they will know tomorrow. The learned about nutrition and calories before the found out about normal growth. This importa piece of the picture puzzle was lacking and is ju beginning to be fitted in now.

Science does change when confronted wit facts—and a great many facts have been comin along during the past twenty years.

As is well known, a great deal of work ha been done in the psychologic field to sift the fa

From the Rochester Child Health Project, Section on Pediatrics, the Mayo Clinic.

in a child's early environment, to determine ch are helpful and which are obstructive or urbing.

Educators in the schools have also been lying scientific methods to the curriculum and finding that various subjects can be taught e efficiently when the mental development of ild has reached a definitely appropriate stage. is now recognized, for instance, that the ity to read is a developmental step and that re eye and brain are set for this accomplishnt in the individual child he cannot learn to l well. To know more about the stages of ntal development is one of the goals of eduional research today.

Most significant of all, perhaps, the steps in ysical growth are being studied intensively l are yielding a new yardstick for the evaluon of the care of children. Such research, ably that carried on in the laboratory of Dr. nold Gesell, The Clinic of Child Development, le University has revealed two important facts. rst, there is a startling uniformity in the seence of the stages in human development; for tance, practically all babies sit up, crawl, stand l walk in this sequence. Second, the stages a child's growth can be predicted accurately m month to month.

On the basis of these facts, a developmental edule of growth can be plotted which is applible to all children, although the rate of growth ries. For instance, it is known that an aver- normal baby will smile at about 6 weeks, will able to reach out for objects with both hands approximately 4 months, will develop pincer vements of the fingers and thumb at 9 to 11 nths and will be able to attain control of the dder in the second year.

The importance of these simple discoveries nnot be overemphasized, because when their plications sank in it was realized that the early rmation of habits of eating, sleeping and elimition, as well as the early acquisition of motor ills, was more dependent on the maturation of e child than on attempts to teach him. It then ppeared logical that he could be taught each act ost easily when the appropriate developmental age had been reached. The whole scheme of rly education became simpler when a detailed owledge of normal growth and development as applied to each problem.

With this background it has come to be alized that many of the problems in personality at parents have faced with children have arisen cause the parents failed to adjust the care of eir children to the newly discovered facts of owth. Young children have been expected to have in ways for which they were not yet ady. Most parents, for instance, have tried to make them eat from spoons before the muscles of their tongues and lip had developed properly. Parents have tried to "train" children against the current of their natural development. This is illustrated repeatedly in premature attempts to train for control of the bowel and the bladder.

As a result, many children have become confused, resistant and subject to emotional storms. Such children are called "spoiled." They have really been misfitted. Obviously the adults must do some revamping of their methods, so that the care of children can be based on the actual needs of growth rather than on arbitrary standards.

What are these needs of growth? Not all of them are known. No one knows all the secrets of the care of children any more than those of farming or of animal husbandry. But those who constantly observe children feel that they do know some of these secrets. Every one agrees that children need fresh air, sunshine, adequate clothing, food and sleep. These physical needs are conscientiously included in every program for nursery care, including that of the Rochester Child Health Project.

But there are other things which have come to be recognized as equally important. Modern babies apparently need a closer contact with their mothers during the first few weeks of life than they are usually allowed. They also need a more individual program: to be fed, for instance, by their own feeding schedules (for every baby has a feeding schedule, if one takes the trouble to find it). In fact, children need to be allowed to use each new ability as it appears: to feed themselves, for instance, as soon as they are able to manipulate a spoon; to walk and climb as they begin to get their equilibrium. For it is in these simple nursery activities that there begins to develop the sense of confidence and competency which every one recognizes as vital to later success.

THE ROCHESTER CHILD HEALTH PROJECT

So much for the background of the Rochester Child Health Project. The project itself has two main objectives: first, to offer all the children of Rochester supervision of health based on the needs of the individual child for optimal growth; second, to study the growth of these children from conception to maturity by means of continuous observation and records. It will be a valuable piece of research in itself to see whether a community can be interested in such a program.

It should be mentioned that Rochester, Minn., a city of about 30,000, provides an unusual opportunity for this sort of program. Practically

all of the children born in the city are under uniform medical supervision. Ninety-five per cent of them are born in one hospital, under the care of the obstetricians of the clinic, and are seen in the home and in the neonatal and the well baby stations by the pediatricians of the clinic.

The project is fortunate also in having the full cooperation and support of the city public health officers, of the city medical, nursing and social service agencies and of the executive officers of the city schools. The school system and the health department already have a well coordinated health program and are ready to consider the present project as one more phase of their work. Thus the project has a unique backlog of help and interest from persons and agencies in the city. I feel, with my associates in the project, that this wholehearted assistance from citizens of Rochester will go far toward making our objectives possible.

We intend to begin with the babies born in 1944, trying to set the environment favorably as they progress through the years. As we picture the organization of the project at the time of writing, there will be five principal types of care, each adapted to a different age group.

The Antepartum Clinic.—In this clinic we shall be interested not only in the diet and physical hygiene of the mother but in her attitude toward the coming baby. She and her husband will be encouraged to learn what a newborn baby is like, what the baby will need from them, why breast feeding is important and how to prepare their home for the advent of the new inmate.

At present we propose to offer this education partly by means of classes, partly by individual talks at conferences and partly by a series of leaflets to be filed by the mother in a loose leaf folder. During the early years this folder will also be used to summarize the measurements of growth and to preserve a record of illnesses, immunizations and any other facts of interest in regard to health.

Hospital Care.—During the mother's stay in the hospital after the birth of the baby, every effort will be made to give both baby and mother not only good physical care but a satisfying and comfortable time together, and to institute breast feeding of as high a percentage of babies as possible.

It is anticipated that the technic of caring for newborn babies will have to be studied and modified considerably, and to that end we are now making plans. For instance, on dismissal to go home the mother is instructed not to be afraid to pick up her baby when he cries unduly, and she is told that rocking chairs are back in style. Most of the modern young mothers are surprised and relieved to learn that they can be motherly.

Well Baby Clinic.—Continuing at the well baby clinic, the baby will be seen at least once a month or oftener if necessary for a check-up on feeding, general supervision of health and inoculation against contagious diseases. The mother and the father will also be offered a chance at these conferences to learn more about the social development and the formation of habits in the baby. This teaching will be based on study of growth and development.

Preschool Clinic.—Less frequent follow-up at a formal clinic is expected for the preschool child. Probably some of the work will be carried on through the education of small groups of mothers and children from the same neighborhood, supervised by trained nursery school workers. One or two nursery schools will be organized as demonstration centers. During these years we expect to continue our interest in growth and development as they affect the formation of habits and the social interests of children. We hope also to prepare mother and the child for the public school, so that the children will retain the natural desire to learn and will preserve the sense of adequacy which we have tried to foster during their early years.

School Health Program.—We shall try to protect children from undue incidence of disease by routine examinations and by supervision of health. We also hope to continue the study of growth and development in cooperation with the teaching program so that the utmost abilities of the individual pupils may be utilized as they grow.

RESEARCH

It is natural that out of such a program should come many questions. Research, therefore, will be an inevitable part of our activities.

Already we are devoting considerable time to an attempt to understand why babies cry and to learn how to prevent excessive crying both during the period spent in the hospital and after the babies go home.

At present, in spite of every care, the highest human mortality occurs in the first two weeks of life. We are trying to collect facts which will help us better to meet the physiologic needs of these young children at a critical stage of their growth.

Research has also been started to see whether it is possible to correlate the muscular tension of newborn infants with their emotional behavior. We expect to carry these observations on as the children grow up, in order to discover whether dynamic personality is a native characteristic and whether it can be recognized at birth.

Obviously there will accumulate a file of histories of many of the children in the community. Summaries of the salient points in these histories are being made by means of a punch card system of records so that they may be easily collected at any time for study.

It is anticipated that while we shall keep some records of measurements of growth, this phase of the research will not be emphasized. Equal attention will be given to the mental and emotional development of the children under our care.

APPLICATION

This means that we shall be especially interested in preventing disturbances of behavior and in encouraging each child to develop his own best possibilities.

This approach to problems of behavior—attacking them through early prevention rather than through later treatment in child guidance clinics—is a fundamental part of our project. It would be impossible to set up the machinery necessary to treat successfully all the unhappy and mishandled children of any community, because of the number of such children. We are interested in finding out whether, by mass education as to prevention, we can obtain a better result, with less expenditure of time and money, than has been obtained under existing methods. This seems to us a practical objective, since mental disease is one of the major problems of the present time.

It is understood that only the broad aspects of mental health can be touched by such a program. Economic factors, hereditary tendencies and the complexity and confusion of the present world are bound to create stresses, but it will be interesting to see how many children brought up in a community where parents understand the implications of normal growth will get the basic confidence needed to meet these strains.

We feel too that we should be interested, and we are interested, in a still wider aspect of the development of the community. An effort at promoting the growth of the individual must have some relation to democratic citizenship. The children now growing up will be the leaders of the future. Successful leaders in a democracy must be emotionally stable enough to stand on their feet and to give and take with their neighbors. This emotional stability must stem from a basic security and confidence, the kind that grows up from childhood. It does not seem impossible that human nature may have more potentialities for cooperation than has hitherto been believed. A start at testing these possibilities can be made by applying the wholesome principles of growth to the care of children.

PREPARATION AND IMMUNIZING PROPERTIES OF PROTAMINE DIPHTHERIA TOXOID

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Alum-precipitated diphtheria toxoid is antigenically superior to "fluid" toxoid, since it elicits a higher titer of antitoxin when equal quantities (Lf) are injected. Fewer injections are consequently needed to produce a satisfactory immunity against diphtheria. However, both in adults and in adolescents its use frequently results in disagreeable reactions, largely local but occasionally systemic. There has been, therefore, a tendency to return to the use of "fluid" toxoid, even though it involves the extra burden of additional injections. Even this preparation produces in some adults reactions which are so annoying that the immunization may not be carried to completion. This eventuality may be avoided by resorting to very small doses of toxoid, but the objection to this method is the length of time it takes to administer the total volume required. The reactions are ascribed partly to bacterial body protein which goes into solution in the course of the autolysis of some of the diphtheria bacilli and partly to the proteins used in preparing the broth for growing the organisms. These substances are in part precipitated along with the toxoid when alum is added to the solution. Finally, it is believed that some persons are sensitive to the toxoid itself.

It occurred to the writer that diphtheria toxoid might be precipitable by protamine and that such a precipitate might possess the immunizing advantages of alum-precipitated toxoid and yet not give rise to the undesirable reactions that the latter preparation sometimes produces in adults and in older children. This procedure has been tried, and it has been found that diphtheria toxoid can be precipitated by protamine and that the precipitate will immunize guinea pigs and human beings. It produces only slight erythema and induration in children: About 2,600 children have been immunized with 1 cc. of the new preparation without a single child's having come ill. In adults the reactions are qualitati the same but quantitatively greater: Even w erythema and induration were largest inter ence with motion of the arm did not take pl A rise in body temperature occurred infrequen (in 3 adults who were extremely sensitive judged by the "reactor" test). The number adults that have been inoculated is not yet la enough to justify omitting the "reactor," "sensitivity," test before deciding on the quant to be injected.

The experimental data will be presented un the following headings: (1) preparation of protamine toxoid, (2) reactions following int dermal injection of equivalent quantities of new preparation and of alum-precipitated a of "fluid" toxoid in adults, (3) immunizing pro erties as determined in guinea pigs and (4) re tions and immune response following subcu neous injection in (*a*) adults and (*b*) childre

PREPARATION OF PROTAMINE TOXOID

To each cubic centimeter of diphtheria toxo made with veal extract there are added 10 m of sodium chloride and 3.5 mg. of protami sulfate, the protamine component of which is d rived from sperm of mature testes of fish belon ing to the family Salmonidae. The quantities sodium chloride and of protamine sulfate m vary with different lots of "fluid" toxoid. T mixture is allowed to stand for two days at roo temperature and is then centrifuged. The ba terial body protein is precipitated along with so broth protein, while the toxoid remains in solutio To the supernate is added three volumes of di tilled water. The protamine toxoid appears in extremely fine state of subdivision. After o hour 1 cc. of a 0.4 per cent solution of potassiu alum ($KAl\ [SO_4]_2.12H_2O$) is added for eve 10 cc. of the suspension. This adsorbs t precipitate, which then settles rapidly. The sed ment is washed with isotonic solution of sodiu chloride and resuspended in a volume of s solution equal to that of the original toxo Sufficient sodium ethyl mercurithiosalicylate added to make 1 part in 7,500. There are 150 more flocculating units per milligram of nitrog

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such a preparation. This nitrogen includes derived from the protamine, estimated at ut one-half the total. Therefore, the ratio of culating units to milligrams of broth nitrogen bout 300 to 1.

PARATIVE REACTIONS PRODUCED BY INTRA-ERMAL INJECTION OF PROTAMINE TOXOID, ALUM-PRECIPITATED TOXOID AND "FLUID" TOXOID

A 1 to 10 dilution of protamine toxoid and of alum-precipitated toxoid were prepared isotonic solution of sodium chloride, and 2 cc. of each was injected intradermally into rearm of each of 18 adults whose ages ranged m 21 to 28 years. The arms were examined r twenty-four and forty-eight hours, and asurements were made of the areas of ery-ma. In every instance the alum-precipitated oid produced a central redder area and an er, less intensely red, area. The protamine oid produced two zones in about one half the subjects and only one zone in the rest. every case the total area of erythema was y much greater at the site of the injection the alum-precipitated toxoid. Table 1 shows t the smallest ratio of the area of erythema duced by alum-precipitated toxoid to that pro-

BLE 1.—*Erythema Produced by Intradermal Injection of 0.02 Cc. of a 1 to 10 Dilution of Protamine Toxoid and of Alum-Precipitated Toxoid (Diphtheria) in Adults*

Protamine Toxoid Erythema (in Mm.)		Alum-Precipitated Toxoid Erythema (in Mm.)	
After 24 Hr.	After 48 Hr.	After 24 Hr.	After 48 Hr.
12 × 7	5 × 3	22 × 20	17 × 12
2 × 3	4 × 2	12 × 16	10 × 15
5 × 2	0	10 × 10	20 × 14
6 × 4	3 × 3	13 × 13	12 × 11
11 × 7	15 × 15	30 × 32	45 × 35
10 × 7	6 × 4	25 × 22	32 × 32
7 × 8	16 × 13	18 × 18	25 × 25
3 × 2	2 × 2	14 × 16	10 × 13
5 × 6	4 × 3	15 × 25	6 × 7
13 × 13	26 × 22	25 × 16	35 × 58
13 × 23	31 × 26	30 × 40	55 × 62
6 × 4	4 × 4	11 × 13	5 × 5
5 × 5	4 × 4	32 × 40	28 × 33
15 × 20	14 × 25	25 × 23	37 × 35
2 × 1	0	9 × 9	5 × 2
2 × 1	0	22 × 16	7 × 4
10 × 6	5 × 2	20 × 28	10 × 11
5 × 6	5 × 6	15 × 15	9 × 18

ced by protamine toxoid was 4 and the largest io 50.[1] Also, the intensity of redness was nsiderably greater with the alum-precipitated oid.

Table 2 shows the results of intradermal in-tion of a 1 to 10 dilution of protamine toxoid d of a 1 to 20 [1a] dilution of the regular "fluid" oid. The ratio of the respective volumes ected was different in each of three groups of subjects and is indicated in the table. Arms were examined after twenty-four and forty-eight hours and in some instances after seventy-two hours as well. For equal quantities (Lf units) of toxoid (subjects 30 to 35) the areas of erythema produced by the "fluid" toxoid customarily used for immunization were from 3 to 200 times as large as those produced by the protamine toxoid. In those subjects (19 to 29) who received two and one-half times as much "fluid" toxoid as protamine toxoid the areas of erythema were 18 to 600 times as great for the former as for the latter in 8 out of 10 subjects; in the remaining 2 they were about 8 times as great. In the group in which twice as much protamine toxoid as "fluid" toxoid was given 2 subjects

TABLE 2.—*Erythema Produced by Intradermal Injection of a 1 to 10 Dilution of Protamine Toxoid and of a 1 to 20 Dilution of "Fluid" Toxoid (Diphtheria) in Adults*

Subject	Protamine Toxoid * Erythema (in Mm.)			"Fluid" Toxoid * Erythema (in Mm.)		
	After 24 Hr.	After 48 Hr.	After 72 Hr.	After 24 Hr.	After 48 Hr.	After 72 Hr.
19	5 × 5	5 × 4	5 × 4	10 × 11	40 × 21	12 × 10
20	6 × 4	6 × 5	4 × 4	22 × 27	40 × 40	45 × 15
21	0	0		5 × 4	12 × 7	
22	5 × 2	12 × 9	4 × 5	20 × 20	50 × 40	52 × 65
23	6 × 2	10 × 12	6 × 5	25 × 25	50 × 50	60 × 62
24	6 × 3	4 × 4		9 × 4	10 × 12	
25	4 × 4	3 × 3		8 × 8	13 × 11	
26	4 × 1	4 × 4		60 × 60	60 × 60	
27	3 × 5	5 × 4		11 × 11	24 × 20	
28	4 × 4	4 × 4		70 × 30	130 × 75	
29	7 × 5	5 × 2		30 × 26	60 × 40	
30	4 × 2	3 × 5		16 × 19	10 × 11	
31	9 × 13	10 × 11		21 × 20	22 × 21	
32	4 × 2	2 × 5		37 × 45	37 × 25	
33	18 × 18	11 × 9		45 × 70	100 × 50	
34	5 × 5	5 × 4		12 × 15	15 × 10	
35	4 × 3	3 × 1		6 × 6	4 × 3	
36	3 × 1	3 × 1		10 × 6	8 × 5	
37	4 × 3	5 × 3		7 × 6	5 × 5	
38	4 × 2	0		3 × 2	0	
39	20 × 20	6 × 6†		50 × 50	13 × 5†	

* Subjects 19 to 29 inclusive received 0.02 cc. of protamine toxoid (1 to 10 dilution) and 0.1 cc. of "fluid" toxoid (1 to 20 dilution); subjects 30 to 35 inclusive, 0.05 cc. of protamine toxoid (1 to 10) and 0.1 cc. of "fluid" toxoid (1 to 20); subjects 36 to 38 inclusive, 0.05 cc. of protamine toxoid (1 to 10) and 0.05 cc. of "fluid" toxoid (1 to 20). Subject 39, when a Schick test indicated marked sensitivity, was given 0.02 cc. of a 1 to 10 dilution of protamine toxoid and 0.1 cc. of a 1 to 200 dilution of "fluid" toxoid.

† Ninety-six hour reading.

1. Subject 16 is omitted from this calculation.

1a. This is a preparation used for performing the so-called "sensitivity," or "reactor," test. The reason that 0.1 cc. of this preparation was injected in most of these subjects is that protamine toxoid was later to be given to them subcutaneously, and the area of erythema produced by the intradermal injection of the standard amount of "fluid" toxoid employed currently in the "reactor" test (0.1 cc. of a 1 to 20 dilution of regular "fluid" toxoid) was to be used as a guide to the volume to be administered subcutaneously. The intradermally injected dose of protamine toxoid was kept in about half the cases at 0.02 cc. of a 1 to 10 dilution in order to learn how the subjects in table 1 might have been expected to react to 0.1 cc. of "fluid" toxoid (1 to 20 dilution), since they also were to receive subcutaneous injections.

(36 and 37) had respectively twenty and three times as large an area of erythema at the site of injection of the latter preparation as at the site of injection of the former. In the third subject (38) the areas were about the same. Finally, in subject 39 four times as much protamine toxoid as "fluid" toxoid produced only one-sixth as large an area of erythema. The wide variations may be due in part to the fact that reactions are not produced by the same antigen or antigens in all persons. One person may be sensitive to one or more than one component of the toxoid preparation, while a second person may also be sensitive to one or more components, some or all of which may be different from those to which the first subject reacts. In addition, the degree of sensitivity to a given antigen varies in different subjects.

A similar experiment has recently been done in which all three preparations (0.04 cc. of a 1 to 20 dilution of each) were injected intradermally at the same time into 20 adults, the relative sites of injection of the three materials varying from person to person. The protamine toxoid employed in this test was made from the same kind of broth as was used before, but the "fluid" toxoid was made from broth which contained only 75 per cent as much veal extract as was formerly used, and the alum-precipitated toxoid was in turn made from this "fluid" toxoid. Table 3 shows the results. Here also areas of erythema were considerably larger and intensities noticeably greater with the last two preparations.

IMMUNIZING PROPERTIES OF PROTAMINE TOXOID AS DETERMINED IN GUINEA PIGS

A number of experiments have been done over a period of time to test the immunizing capacity of the new preparation. Each experiment was done with a different lot of protamine toxoid, so that the data are both a measure of the efficacy of the material as an immunizing agent and a test of the method of preparing it. One cubic centimeter (25 Lf) of protamine toxoid was injected subcutaneously into guinea pigs, which were bled four weeks later. The serums of 4 or 5 animals were pooled and tested by the Ehrlich method. Twenty-five such preparations were thus tested. Five produced 1 unit of antitoxin per cubic centimeter of guinea pig serum, 6 produced 2 units, 8 produced 3 units (with 3 of these a test for more than 3 units was not done), 4 produced 4 units (with 2 of these a test for more than 4 units was not done) and 2 produced 5 units. In two of the five experiments in which 1 unit of antitoxin was found the Ehrlich test was done with pigs weighing only 205 to 215 Gm., for lack of animals weighing 250 Gm. A preparation tested on guinea pigs four and one-half months after it had been prepared (during which time it had been kept at room temperature) elicited 3 units of antitoxin per cubic centimeter of pooled serum, showing no detectable loss in antigenicity. It was also effective in converting positive reactions to the Schick test in children to negative reactions. Another preparation, which had been kept in the refrigerator for thirteen months, also was active.

The following data give some information concerning the duration of immunity in guinea pigs. In an experiment in which the initial value (four weeks after an injection of 1 cc. of protamine toxoid) was 3 units of antitoxin there was 1 unit after eleven weeks, the same after fifteen and one-half weeks, 0.5 unit after twenty-five weeks and 0.5 to 1 unit after one year.[2] In another experiment in which the first value was 3 units there was 2 units after eleven weeks, 1 unit after fifteen and one-half weeks, 0.6 to 0.8 unit after twenty-five weeks, nearly 1 unit after one year[2] and 0.2 to 0.5 unit after one and one-half years. The pooled serums of a third group of animals which had produced 2 units after four weeks contained less than 1 unit after three months.

The following experiments give additional data regarding the duration of immunity in guinea pigs. They also show the extent of production of antitoxin after a second dose of protamine toxoid. In an experiment in which 1 unit of antitoxin was formed in four weeks 0.7 unit was found after six months. At this time another injection of 1 cc. of toxoid was given. Six weeks later there was at least 7 units of antitoxin per cubic centimeter of pooled serum; tests for more than 7 units were not done. In another experiment in which 1 unit of antitoxin was present at the time of the first test there were 4 units six weeks after a second injection. Two units of antitoxin per cubic centimeter of pooled serum was present after the first injection of toxoid in another instance. After three months there was between 1 and 1½ units, and after six months there was 0.9 unit per cubic centimeter. A second injection was then given, consisting of 0.5 cc. Six weeks later there was at least 7 units of antitoxin per cubic centimeter. Still another group of animals that produced 1 unit of antitoxin after the first injection of protamine toxoid produced 7 units after a second injection.

2. The fact that the values were somewhat higher after a year than after twenty-five weeks may be due to the circumstance that it was not always the same 4 guinea pigs from the group of 6 animals immunized that were bled.

SERVATIONS AFTER SUBCUTANEOUS ADMINISTRATION OF PROTAMINE TOXOID TO ADULT HUMAN BEINGS

Each of the subjects listed in tables 1 and 2 sequently received two or three subcutaneous ections of protamine toxoid. The interval of e between injections was generally three eks, and the preparations contained 25 Lf ts per cubic centimeter. The site of the inion was examined twenty-four, forty-eight seventy-two hours later and sometimes at ervals thereafter. Measurements were made the erythema and of the induration.

Results with Subjects Who Had Had the ndard "Sensitivity" Test.—The results obned with subjects 19 to 35 inclusive, recorded ewith, are of particular interest, since the nsitivity" ("reactor") test had been done on se subjects in the standard manner. It is erally recommended that if this test produces area of erythema of 12 by 12 mm. or larger s inadvisable to inject 1 cc. of "fluid" or alumcipitated toxoid at one time. The reactions orded should be compared with the results in le 2. At the end of the description of the served reactions for each of subjects 19 to 35 lusive there are given in parentheses the asurements of the erythematous area proced by the "sensitivity" test.

UBJECT 19.—Erythema 7 by 6 cm. with induration 3 3 cm. twenty-four hours after administration of c. of toxoid. Erythema 15 by 11 cm. with induration y 3 cm. in forty-eight hours. Twenty-four hours r second dose (1 cm.) erythema 8 by 7 cm. with uration of 3 by 3 cm. All gone in forty-eight hours. by 21 mm.)

UBJECT 20.—Slight erythema 2 by 2 cm. with indura- 3 by 3 cm. twenty-four hours after administration 0.5 cc. After forty-eight hours erythema 8 by m. with induration 4 by 4 cm. Twenty-four hours r second dose (1 cm.) erythema 9 by 10 cm. with uration 5 by 5 cm. After forty-eight hours erythema y 13 cm. with induration 4 by 3 cm. (40 by 40 mm.).

UBJECT 21.—Pale erythema 3.5 by 3 cm. with slight uration twenty-four hours after administration of 1 After forty-eight hours pale erythema 3.5 by m. with slight induration. Twenty-four hours after ond dose (1 cc.) moderate erythema 5 by 4.5 cm. h a little induration. After forty-eight hours very e erythema 6 by 5 cm. with little or no induration. by 7 mm.)

UBJECT 22.—Erythema 4.5 by 3 cm. with induration y 1 cm. twenty-four hours after administration of cc. After forty-eight hours erythema 10 by 11 cm. h induration 4 by 4 cm. After seventy-two hours thema 10 by 12 cm. with induration 4 by 4 cm. ter six days an area 3 by 3 cm. slightly tan and uration 1 by 1 cm. Twenty-four hours after administion of second dose (0.25 cc.) pale erythema 4 by m. with induration 2 by 2 cm. After forty-eight rs erythema 9 by 12 cm.; no induration. Twenty- r hours after third dose (0.5 cc.) erythema 5 by 6 cm. with no induration. After forty-eight hours very faint erythema 7 by 8 cm. After seventy-two hours all gone. (52 by 65 mm.)

SUBJECT 23.—Erythema 3 by 4 cm. with induration 2 by 3 cm. twenty-four hours after administration of 0.25 cc. After forty-eight hours erythema 8 by 10 cm. with induration 3 by 4 cm. After seventy-two hours moderate erythema 12 by 12 cm. with no induration. After six days all gone; not seen between third and sixth days. Twenty-four hours after second dose (0.5 cc.) erythema 12 by 7 cm. with slight induration 3 by 2 cm. After forty-eight hours erythema 9 by 12 cm. with no induration. Twenty-four hours after third dose (0.5 cc.) pale erythema 5 by 3 cm. with no induration. After forty-eight hours all gone. (60 by 62 mm.)

SUBJECT 24.—Moderate erythema 5.5 by 4 cm. with induration twenty-four hours after administration of 1 cc. After forty-eight hours erythema 9 by 8 cm. with induration 5 by 4 cm. After seventy-two hours erythema 6 by 5.5 cm. with reduced induration. Twenty-four hours after second dose (1 cc.) pale erythema 5 by 4 cm. with induration 2 by 2 cm. After forty-eight hours pale erythema 7 by 6 cm., with little or no induration. (10 by 12 mm.)

SUBJECT 25.—Erythema 3 by 1 cm., with induration 1 by 1 cm. twenty-four hours after administration of 0.5 cc. After forty-eight hours very pale erythema 2.5 by 3.5 cm. with some induration. After four days no erythema; very little induration. Twenty-four hours after second dose (0.5 cc.) erythema 3 by 4 cm. with no induration. After forty-eight hours erythema 6 by 7 cm.; no induration. After six days all gone; not seen between third and sixth days. Forty-eight hours after third dose (1 cc.) moderate erythema 5.5 by 8 cm. Not seen in twenty-four hours or after second day. (13 by 11 mm.)

SUBJECT 26.—Moderate erythema 10 by 8 cm. with no induration twenty-four hours after administration of 0.25 cc. After forty-eight hours erythema 11 by 12 cm. with induration 3 by 3 cm. After six days no erythema; very little induration. Not seen between second and sixth days. (60 by 60 mm.)

SUBJECT 27.—Erythema 3 by 2.5 cm., with induration 2 by 2 cm., twenty-four hours after administration of 0.5 cc. Not seen again till fourth day, when there was erythema with induration 2.5 by 2.5 cm. Twenty-four hours after second dose (1 cc.) erythema 9 by 7 cm. with induration 4 by 3 cm. After forty-eight hours erythema 14 by 13 cm. with induration 4 by 3 cm. (24 by 20 mm.)

SUBJECT 28.—Erythema 4 by 4 cm. with induration 2 by 1 cm. twenty-four hours after administration of 0.25 cc. After forty-eight hours erythema 9 by 10 cm. with induration 2 by 2 cm. After six days no erythema; induration 1 by 1 cm. Not seen between second and sixth days. Twenty-four hours after second dose (0.5 cc.) erythema 7 by 6 cm. with induration 3 by 3 cm. After forty-eight hours erythema 12 by 9 cm. with no induration. Twenty-four hours after third dose (0.5 cc) mild erythema 7 by 6.5 cm. After forty-eight hours very pale erythema 7 by 6 cm. After seventy-two hours very faint erythema 1.5 by 1 cm. No induration at any time. (130 by 75 mm.)

SUBJECT 29.—Erythema 3 by 3 cm. with induration 1 by 1 cm. twenty-four hours after administration of 0.25 cc. After forty-eight hours erythema 4 by 5 cm. with induration 2 by 2 cm. On sixth day no erythema;

very little or no induration. Not seen between second and sixth days. Twenty-four hours after second dose (0.5 cc.) erythema 4 by 4 cm. with no induration. After forty-eight hours erythema 4 by 4 cm. with no induration. Twenty-four hours after third dose (1 cc.) erythema 6 by 7 cm. After forty-eight hours faint erythema 8 by 6 cm. After seventy-two hours faint erythema 6.5 by 7 cm. No induration at any time. (60 by 40 mm.)

SUBJECT 30.—Very pale erythema 3.5 by 2.5 cm. with little or no induration twenty-four hours after administration of 1 cc. After forty-eight hours erythema 7 by 6 cm. with little induration. Twenty-four hours after second dose (1 cc.) erythema 6 by 4 cm. with induration 2 by 2 cm. After forty-eight hours erythema 5 by 3 cm. with induration 5 by 3 cm. (16 by 19 mm.)

SUBJECT 31.—Erythema 6 by 5 cm. with induration 2 by 2 cm. twenty-four hours after administration of 1 cc. After forty-eight hours erythema 7 by 8 cm. with induration 4 by 4 cm. After seventy-two hours erythema 10 by 10 cm. with induration 4 by 4 cm. Twenty-four hours after second dose (1 cc.) erythema 4.5 by 5 cm. with some induration. (22 by 21 mm.)

SUBJECT 32.—Erythema 4 by 4 cm. with induration 2 by 3 cm. twenty-four hours after administration of 1 cc. After forty-eight hours erythema 8 by 8 cm. with induration 3 by 3 cm. After seventy-two hours erythema 4 by 4 cm. with induration 1 by 1 cm. Twenty-four hours after second dose (1 cc.) mild erythema 9 by 7 cm. with slight induration 2 by 2 cm. After forty-eight hours erythema 9 by 12 cm., hardly visible. (37 by 45 mm.)

SUBJECT 33.—Erythema 4 by 4 cm. with no induration twenty-four hours after administration of 0.25 cc. After seventy-two hours mild erythema 8 by 6 cm. with no induration. On sixth day all gone. Not seen between third and sixth days. Twenty-four hours after second dose (0.5 cc.) erythema 10 by 8 cm. with induration 2 by 2 cm. After forty-eight hours all gone. Twenty-four hours after third dose (0.5 cc.) slight erythema 7 by 6.5 cm. with no induration. After forty-eight hours slight erythema 7 by 6 cm. with no induration. After seventy-two hours all gone. (100 by 50 mm.)

SUBJECT 34.—Erythema 3 by 2 cm. with induration 3 by 2 cm. twenty-four hours after administration of 1 cc. After forty-eight hours erythema 5 by 6 cm. with induration 2 by 2 cm. Twenty-four hours after second dose (1 cc.) erythema 5 by 4 cm. with induration 2 by 2 cm. After forty-eight hours all gone. (15 by 12 mm.)

SUBJECT 35.—Erythema 2 by 1 cm. with induration 2 by 1 cm. twenty-four hours after administration of 1 cc. After forty-eight hours light erythema 5.5 by 3 cm. with very little induration. Twenty-four hours after second dose (1 cc.) very slight erythema 4 by 4 cm. with no induration. (6 by 6 mm.)

Results with Subjects Who Had Received a Modified "Sensitivity" Test.—The following descriptions apply to subjects who had been given intradermal injections of 0.05 cc. each of a 1 to 20 dilution of "fluid" toxoid (one half of the quantity used in the usual "sensitivity" test) as part of an experiment which was done to compare the toxicity of the regular toxoid with that of the new toxoid preparation (see table 2).

SUBJECT 36.—Erythema 2 by 1 cm. with induration 2 by 2 cm. twenty-four hours after administration of 1 cc. After forty-eight hours erythema absent; induration 4 by 2 cm. Twenty-four hours after second (1 cc.) erythema 4 by 4 cm. with no induration. forty-eight hours erythema 6 by 5 cm. with no duration. After seventy-two hours very pale eryt 5 by 4 cm. with no induration. On sixth da erythema; no induration.

SUBJECT 37.—Erythema 3 by 2 cm. with indur 2 by 1 cm. twenty-four hours after administrati 1 cc. After forty-eight hours erythema 7 by 5 with induration 4 by 4 cm. Twenty-four hours second dose (1 cc.) pale erythema 4 by 4 cm. wit induration. After forty-eight hours no erythema induration.

SUBJECT 38.—Erythema 1 by 1 cm. twenty-four h after administration of 1 cc. After forty-eight hour erythema; no induration. Twenty-four hours second dose (1 cc.) pale erythema 3 by 4 cm. wit induration. After forty-eight hours no erythema induration.

SUBJECT 39.[3]—Erythema 5 by 8 cm. with indur 4 by 4 cm. twenty-four hours after administrati 0.25 cc. After forty-eight hours erythema 12 by cm. with induration 5 by 5 cm. After seventy hours erythema 15 by 11 cm. with induration 6 by 6 After ninety-six hours erythema 15 by 15 cm. induration 4 by 4 cm. On sixth day no eryth induration 3 by 3 cm. Twenty-four hours after se dose (0.25 cc.) pale erythema 6 by 5 cm. with s induration 3 by 3 cm. After forty-eight hours erythema 7 by 8 cm. with induration 0.5 by 0.5 Twenty-four hours after third dose (0.5 cc.) erythe by 7 cm. After forty-eight hours erythema 7.5 by 8

Results with Subjects Who Had Not ceived a Standard Sensitivity Test.—It is also interest to record the reactions observed in th subjects on whom a preliminary sensitivity t as usually done, was not performed. Th subjects had been used for a comparison of relative irritant properties of alum-precipita toxoid and protamine toxoid by means of int dermal injection of small amounts (see table It is felt that a record of the observations m after subcutaneous injections in these subje will contribute to a proper estimate of the va of the new preparation.

SUBJECT 1.—Pale erythema 3.5 by 2 cm. with indu tion 3.5 by 2 cm. twenty-four hours after administra of 0.5 cc. Subject not seen again till fifth day, w erythema and induration were gone. Twenty-four h after second dose (1 cc.) erythema 6 by 5 cm. w induration 3 by 3 cm.

SUBJECT 2.—Very pale erythema 2 by 1.5 cm. w slight induration, twenty-four hours after adminis tion of 1 cc. After forty-eight hours very pale eryth 2 by 1.5 cm. with slight induration. After seve two hours no erythema; slight induration. Twenty-f hours after second injection (1 cc.) erythema 4 by 3 with induration 4 by 5 cm. After forty-eight h erythema 4 by 4 cm. with induration 1 by 1 cm.

SUBJECT 3.—Very pale erythema 3 by 1 cm. w slight induration twenty-four hours after administrat of 1 cc. Subject not seen again till fifth day, when

3. In the intradermal test this subject received jections of 0.02 cc. of a 1 to 10 dilution of protam toxoid and 0.1 cc. of a 1 to 200 dilution of "fluid" tox

normal. Twenty-four hours after second dose of erythema 6 by 5 cm. with no induration. After eight hours slight erythema 6 by 5 cm. with no ation.

BJECT 4.—Erythema 3 by 2 cm. with slight indura- 2 by 2 cm. twenty-four hours after administration 5 cc. After forty-eight hours erythema 4 by 3 with induration 5 by 4 cm. After seventy-two erythema 4.5 by 5 cm. with little or no indura- Twenty-four hours after second dose (1 cc.) ema 4 by 3 cm. with induration 2 by 2 cm. After eight hours slight erythema 7 by 6 cm. with mild ation 3 by 2 cm. On sixth day no erythema; ation 3 by 3 cm.

BJECT 5.—Erythema 5 by 4 cm. with induration 2 cm. twenty-four hours after administration of c. After forty-eight hours erythema 7 by 8 cm. induration 4 by 4 cm. Twenty-four hours after d dose (1 cc.) erythema 10 by 9 cm. with no ation. After seventy-two hours erythema hardly e.

BJECT 6.—Very pale erythema 2.5 by 3 cm. with duration twenty-four hours after administration of c. After forty-eight hours erythema 5 by 5 cm. seventy-two hours erythema 6.5 by 8 cm. On day very pale erythema 5 by 7 cm. with no in- ion. Twenty-four hours after second dose (0.5 erythema 7 by 5 cm. with little or no induration. forty-eight hours erythema 8 by 8 cm. After nty-two hours erythema 9 by 9 cm. with induration 1 cm. Twenty-four hours after third dose (1 cc.) ema 9 by 7 cm. with induration 4 by 4 cm. After eight hours erythema 10 by 10 cm. with no in- ion.

BJECT 7.—Erythema 3 by 3 cm. with induration 3 cm. twenty-four hours after administration of c. After forty-eight hours erythema 8 by 8 cm. induration 4 by 4 cm. Twenty-four hours after d dose (1 cc.) erythema 6 by 6 cm. with induration 2 cm. After forty-eight hours pale erythema 10 cm. with no induration.

BJECT 8.—No erythema and no induration twenty- and forty-eight hours after administration of 0.5 cc. nty-four hours after second dose (1 cc.) erythema 5 cm. with induration 2 by 2 cm.

BJECT 9.—Erythema 6 by 4 cm. with induration 2 cm. twenty-four hours after administration of After forty-eight hours erythema 10 by 7 cm. no induration. Twenty-four hours after second (1 cc.) pale erythema 6 by 7 cm. with no in- ion. After forty-eight hours pale erythema 10 by with no induration. After seventy-two hours no ema; slight induration.

BJECT 10.—Erythema 5 by 5 cm. with induration 2 cm. twenty-four hours after administration of c. After seventy-two hours pale erythema 12 by m. with induration 2 by 2 cm. Twenty-four hours second dose (0.5 cc.) erythema 4 by 4.5 cm. no induration. After forty-eight hours erythema 8.5 cm. with mild induration 2 by 2 cm. Twenty- hours after third dose (0.5 cc.) erythema 5.5 cm. After forty-eight hours erythema 4.5 cm.

BJECT 11.—Erythema 5 by 6 cm. with induration 3 cm. twenty-four hours after administration of cc. After forty-eight hours erythema 9 by 12 cm. no induration. On fifth day no erythema; slight ration. Twenty-four hours after second dose of cc. erythema 8 by 9 cm. with no induration. After forty-eight hours erythema 15 by 12 cm. with little or no induration.

SUBJECT 12.—Very pale erythema 2 by 1.5 cm. with a little induration twenty-four hours after administration of 0.5 cc. After forty-eight hours same. On fifth day all gone. Subject not seen between second and fifth days. Twenty-four hours after second dose of 0.5 cc. erythema 5 by 3 cm. with induration 5 by 3 cm. After forty-eight hours very pale erythema 5 by 6 cm. with induration 3 by 3 cm. Twenty-four hours after third dose of 1 cc. erythema 3.5 by 4 cm. with induration 1 by 1 cm. After forty-eight hours pale erythema 4 by 3 cm.

SUBJECT 13.—Erythema 3 by 3 cm. with induration 3 by 3 cm. twenty-four hours after administration of 0.5 cc. After forty-eight hours erythema 6 by 7 cm. with induration 4 by 4 cm. Twenty-four hours after second dose (1 cc.) pale erythema 7 by 6 cm. with no induration.

SUBJECT 14.—Erythema 4 by 3 cm. with induration 2 by 2 cm. twenty-four hours after administration of 0.25 cc. After forty-eight hours erythema 6 by 7.5 cm. with little induration. After seventy-two hours erythema 9 by 10 cm. with induration 3 by 3 cm. Twenty-four hours after second dose (0.5 cc.) erythema 6 by 5 cm. with mild induration 6 by 7 cm. Twenty-four hours after third dose (0.75 cc.) marked erythema 4.5 by 4.5 cm. with no induration. After forty-eight hours erythema 7.5 by 6 cm. with no induration.

SUBJECT 15.—No erythema or induration twenty-four hours after administration of 0.5 cc. No erythema or induration twenty-four hours and forty-eight hours after second dose (0.5 cc.). Twenty-four hours after third dose (1 cc.) pale erythema 2 by 2 cm. with no induration.

SUBJECT 16.—Erythema 5 by 5 cm. with induration 5 by 5 cm. twenty-four hours after administration of 1 cc. Forty-eight hours after second dose of 1 cc. no erythema or induration.

SUBJECT 17.—Erythema 4.5 by 5 cm. with little or no induration twenty-four hours after administration of 0.5 cc. After forty-eight hours erythema 5.5 by 7 cm. with a little induration. Twenty-four hours after second dose of 1 cc. erythema 8 by 9 cm. with induration 2 by 2 cm. After forty-eight hours very pale erythema 7 by 7 cm. with little or no induration.

SUBJECT 18.—Erythema 4.5 by 4.5 cm. with induration 4.5 by 4.5 cm. twenty-four hours after administration of 1 cc. After forty-eight hours erythema 8 by 9 cc. with induration 6 by 6 cm. Twenty-four hours after a second dose (1 cc.) very pale erythema 3.5 by 3 cm. with little or no induration. After forty-eight hours very pale erythema 7 by 7 cm. with little or no induration.

No systemic reactions were observed in any of these subjects. Slight soreness was reported in a few instances, but in no case was motion of the arm restricted.

Subjects 41, 42, 43, 46, 50, 51, 52, 53, 54, 56 and 59 were recently given subcutaneous injections of 1 cc. (25 Lf units) of protamine toxoid (table 3 shows results of intradermal tests). After twenty-four hours subject 41 had slight erythema 2 by 2 cm., subject 50 very slight erythema 2 by 1 cm., subject 56 moderate erythema 3 by 3 cm. and subject 59 mild erythema 4 by 4 cm. The remaining 7 subjects

had no erythema. Subjects 45 and 57 received 0.25 and 0.50 cc. respectively. An erythematous area measuring 10 by 5 cm. developed next day in subject 45, and he had a temperature of 100.5 F. It will be seen from table 3 that the "sensitivity" test, which was done with 0.04 cc. instead of 0.10 cc. of a 1 to 20 dilution of "fluid" toxoid, produced an erythema of 45 to 60 mm. in this subject. There was a central area of erythema (not recorded in table 3) measuring 16 by 24 mm. and very red. At the site of the intradermal injection of alum-precipitated toxoid (also 0.04 cc. of a 1 to 20 dilution) the erythema measured 55 by 45 mm. and there was a small central necrotic area on the third day. Subject 57 had an erythema of 5 by 4 cm. the day after he received 0.50 cc.

1 cm., after twenty-four hours; after forty-e hours there was moderate erythema 7.5 by 8 with no induration. In the intradermal "se tivity" test erythema developed 45 by 30 and 22 by 22 mm. after the injection of 0.0 of alum-precipitated and of "fluid" toxoid spectively. Subject 57, who previously had ceived 0.5 cc., now received 1 cc. He had ind tion 2 by 2 cm., with no erythema, after fo eight hours. He was not seen after twenty- hours. Injections of 0.25 cc. of toxoid w given to subjects 40, 45 (second dose), 49 58. Subject 40 had moderate erythema 0.5 0.5 cm., with induration 0.5 by 0.5 cm., a twenty-four hours and moderate erythema 3.5 2 cm., with the same sized induration, after fo

TABLE 3.—*Erythema Produced by Intradermal Injection of 0.04 Cc. of a 1 to 20 Dilution of Protamine Toxoid, Alum-Precipitated Toxoid and "Fluid" Toxoid (Diphtheria) in Adults*

Subject	Protamine Toxoid Erythema (in Mm.)			Alum-Precipitated Toxoid Erythema (in Mm.)			"Fluid" Toxoid Erythema (in Mm.)		
	After 24 Hr.	After 48 Hr.	After 72 Hr.	After 24 Hr.	After 48 Hr.	After 72 Hr.	After 24 Hr.	After 48 Hr.	After 72 Hr.
40	10 × 9	23 × 23	14 × 14	26 × 25	47 × 48	35 × 30	18 × 15	40 × 34	32 × 3
41	0	0	0	8 × 7	2 × 2	2 × 2	3 × 2	6 × 6	0
42	2 × 3	0	0	6 × 6	5 × 4	5 × 4	5 × 3	4 × 3	3 ×
43	5 × 4	5 × 3	5 × 2	12 × 12	7 × 7	7 × 6	5 × 5	5 × 5	6 ×
44	7 × 10	25 × 20	14 × 12	22 × 22	30 × 38	34 × 35	18 × 18	36 × 38	45 ×
45	15 × 17	25 × 22	8 × 9	26 × 22	55 × 45	*	35 × 20	45 × 60	*
46	0	0	0	14 × 12	3 × 3	3 × 3	6 × 5	4 × 4	5 ×
47	20 × 20	†	†	22 × 26	†	†	30 × 30	†	†
48	4 × 3	3 × 3	.....	30 × 20	60 × 35	.....	8 × 9	*	
49	9 × 8	35 × 30	10 × 8	30 × 22	56 × 55	45 × 40	40 × 26	70 × 92	45 ×
50	4 × 2	2 × 3	.....	11 × 10	2 × 3	.....	8 × 10	5 × 5	
51	5 × 3	3 × 2	.....	10 × 12	30 × 20	.....	7 × 7	*	
52	3 × 3	0	.....	12 × 10	0	.....	6 × 7	0	
53	3 × 2	3 × 1	.....	4 × 5	3 × 3	.....	6 × 5	3 × 6	
54	3 × 3	3 × 2	.....	9 × 8	3 × 3	.....	4 × 4	*	
55	7 × 6	5 × 6	.....	16 × 20	45 × 30	.....	6 × 10	22 × 22	
56	6 × 4	.....	.....	7 × 7	.....	.....	10 × 8		
57	10 × 10	22 × 20	.....	11 × 17	35 × 37	.....	15 × 20	25 × 40	
58	10 × 17	8 × 12	.....	20 × 22	35 × 45	.....	44 × 22	70 × 55	
59	7 × 4	4 × 3	.....	16 × 22	7 × 7	.....	8 × 9	6 × 4	

* Limits of erythema are vague.
† Areas of erythema produced by alum-precipitated and "fluid" toxoid became fused and extended into that prod by protamine toxoid.

Six weeks later subjects 41, 46, 50, 51, 52, 53, 54 and 59 again received injections of 1 cc. of protamine toxoid. Subject 41 had very pale erythema, 1 by 1 cm., with no induration, after twenty-four hours, and very pale erythema 2 by 1 cm., with no induration, after forty-eight hours. Subject 50 had slight erythema 2 by 2 cm., with no induration, in twenty-four hours; after forty-eight hours there was neither erythema nor induration. Subject 51 had pale, diffuse erythema 3.5 by 4 cm., with no induration, after twenty-four hours; after forty-eight hours there was neither erythema nor induration. Subject 53 had no erythema nor induration after twenty-four hours; after forty-eight hours there was very pale erythema 2.5 by 3 cm., with no induration. Neither erythema nor induration developed in the remaining subjects after the first or second day. At this time subject 55 received injection of 1 cc. for the first time. He had mild erythema 3.5 by 4.5 cm., with induration 1 by

eight hours. In the "sensitivity" test erythe areas 47 by 48 mm. and 40 by 34 mm. develo at the sites of injection of alum-precipita toxoid and of "fluid" toxoid respectively. S ject 45 had moderate erythema 4 by 4 cm., w some induration, after twenty-four hours a pale erythema 3.5 by 2 cm., with no indurati after forty-eight hours. There was no rise temperature this time. Subject 49 had sli erythema 6.5 by 2 cm., with induration 5.5 4 cm., after twenty-four hours, with a rise temperature to 102 F. Next morning the te perature was normal and there was moder erythema 10 by 11 cm., with induration 5 5 cm. Subject 58 had erythema 8 by 8 m and a temperature of 101.8 F. after twenty-fo hours. Next morning his temperature was n mal. In subject 49 erythema developed, me uring 56 by 55 mm. and 70 by 92 mm, af the "sensitivity" test with the alum-precipita and "fluid" toxoids (0.04 cc. of a 1 to 20 dilutio

pectively. The areas of erythema in subject 58 e 35 by 45 mm. and 70 by 55 mm. at the esponding sites.

chick Tests Before and After Injection of tamine Toxoid in Adults.—Among the 39 lts listed in tables 1 and 2 whose reactions he subcutaneous injection of protamine toxoid e been described in the text, 9 originally re- d positively to the Schick test. These were jects 6, 12, 15, 25, 31, 35, 36, 37 and 38. All 9 ted negatively to the Schick test after the ctions. The time between the last injection protamine toxoid and the date of the second ick test was as follows: for subject 6, fifty- days; for subject 12, sixty-one days; for sub- 15, sixty-one days; for subject 25, fifty-six s; for subject 31, fifty-six days; for sub- 35, forty-seven days; for subject 36, sixty- days; for subject 37, sixty-one days, and subject 38, sixty-one days.

n addition, there were 5 young adults not ed in table 1, 2 or 3 who reacted positively the Schick test and to whom the protamine oid was administered without previous ing of their intradermal sensitivity. Of who each received a single dose of 0.25 cc. cutaneously 1 reacted negatively after the ction, while the other reacted positively, as ore. The quantities injected in the other 3 jects were, respectively: 0.25 and 0.75 cc.; 5, 0.75, 0.50 and 0.50 cc., and 0.25, 0.75 and cc. All 3 reacted negatively to the Schick . The intervals between the injections were eek or ten days, and the time which elapsed ween the last dose and the second Schick test s six months. No Schick tests were done on the jects reported on in table 3. Fourteen more ng adults not listed in table 1, 2 or 3 who had received the Schick test and who were not mined for sensitivity received injections of tamine toxoid as follows: Three received 5 and 0.75 cc.; 1 received 0.25, 0.25 and 0.50 ; 8 received 0.25, 0.75 and 1.0 cc., and 1 eived 0.25, 0.75, 0.50 and 0.50 cc. Areas erythema and induration in these 14 subjects, well as in the other 5 subjects listed in this ragraph, were observed but not recorded. e range was similar to those previously de- ibed except that there were no instances of y large areas of either erythema or indu- ion. An additional subject who received 5 cc. refused to continue because of the thema and the induration.

IMMUNIZATION OF CHILDREN

To date about 2,600 children, predominantly the 9 to 12 month age group but including ldren up to 13 years of age, have received subcutaneous injections of 1 cc. (25 Lf) of protamine toxoid after an initial Schick test. The reaction consisted of mild to moderate erythema seldom exceeding 2 cm. in diameter and almost always disappearing by the fourth day. There was also a mild degree of induration of the same size, or, more frequently, smaller, which gradually diminished in area until in a large majority of children it was hardly detectable after three weeks. Each of about 750 children have been given two doses of 1 cc. (25 Lf units) each at an interval of one month. The reaction after the second injection resembled that after the first.

Of 238 children [4] who reacted positively to the original Schick test, all but 8 reacted negatively two and one-half to three months after a single injection of 1 cc. After another injection of 1 cc. the Schick test gave negative results in 7 of these 8 children, while the remaining child reacted negatively after a total of three injections. One hundred and nine children originally reacting positively to the Schick test who each received one dose of 1 cc. subcutaneously were tested six to nine months later. All now reacted negatively.

A group of 28 children whose ages ranged from 8 to 13 years were given 1 cc. of protamine toxoid subcutaneously directly after a sample of blood had been drawn for antitoxin titration. The antitoxin content of the blood before and three and one-half to four months after injection of the toxoid was respectively (in units): [5]

Before	After
1/10 to 1/5	1
1 to 2	5
about 1/10	1
1/2	3
1/25 to 1/10	2
1/10	1/2 to 1
1/25	1
1/25	1/2
1/10 to 1/5	3
1/25	3
1/2	2
1/50	1/25 to 1/10
1/50 to 1/25	1/10
1/25	2
1/50 to 1/25	1/2
1/2 to 1	about 8
1/10	2
1/50	1/2 to 1
1/2	2 to 3
1/100 to 1/50	1/10 to 1/5
1/50 to 1/25	1
1/25 to 1/10	3
1/250 to 1/100	8
2 to 3	10 to 12
1/5 to 1/2	10 to 12
1/2000	1/100
1/250 to 1/100	1/5
1/10	4

These data show that there was a definite rise in antitoxin titer after the injection of prot-

4. Forty-eight per cent of these children were between 9 and 12 months old, 22 per cent were from 1 to 3 years old, 21 per cent were from 3 to 7 years old and 9 per cent were from 7 to 13 years old.

5. Miss Frances Clapp, of Lederle Laboratories, Inc., had these determinations made in her laboratory.

amine toxoid, the actual increase varying from subject to subject, as would be expected. Similar experiments with children possessing no antitoxin at the time of immunization are being carried out.

COMMENT

The considerable number of separate protamine toxoid preparations which have been made and found to be effective immunizing agents in guinea pigs and in children indicates that the method outlined for making the protamine toxoid is dependable. It is always desirable to make sure that there has been no loss of toxoid in the first stage. This was done by adding to the 1 cc. quantities of the supernatant 0.25 cc. of a 25 per cent solution of sodium chloride and graduated quantities of antitoxin according to the Ramon procedure. The same ratio of sodium chloride to toxoid is used in testing with antibacterial serum for the removal of bacillary protein. After precipitation of the protamine toxoid by the addition of three volumes of water and its adsorption on the small amount of alum it is desirable to concentrate a portion of the supernate and perform a flocculation test in order to observe whether there has been any loss of toxoid at this stage.

As an alternate method for preparing the protamine toxoid smaller quantities than the 3.5 mg. per cubic centimeter of toxoid recommended earlier in this paper (about 0.5 mg.) have been added without the simultaneous addition of sodium chloride. This precipitates the bacterial protein and leaves the toxoid in solution. The latter may then be precipitated by the addition of more protamine. Such preliminary treatment with protamine (with or without the addition of sodium chloride) for removal of bacillary protein does not interfere with subsequent precipitation of toxoid by alum in the manner employed for preparing the usual alum-precipitated toxoid. One such alum-precipitated toxoid when injected into guinea pigs (1 cc., 25 Lf units) elicited 4 units of antitoxin per cubic centimeter of pooled serum. No test for larger quantities was made.

The results of the intradermal tests show that protamine toxoid is considerably less irritating than either alum-precipitated or "fluid" toxoid. The measurements recorded in the tables, though revealing this, fail to convey the fact that the site of injection of each of the last two preparations was always significantly redder than the site of injection of the protamine toxoid. In order to counteract the effect of possible differences in sensitivity of the skin in different areas the injection of protamine toxoid was sometimes given above and sometimes below the site of injection of the preparation with which it was being compared on the inner aspect of the lower part of the arm. Analysis of a number of preparations shows that the ratio of toxoid to total nitrogen is about 7½ times more favorable in the case of protamine toxoid than it is for alum-precipitated toxoid. If the nitrogen derived from the protamine itself is disregarded and only that derived from the broth is considered the ratio is probably 15 times more favorable in the former. This fact accounts for the considerably lesser reactions with protamine-precipitated toxoid than with alum-precipitated toxoid.

The reactions following subcutaneous injection of protamine toxoid into children indicate a more rapid disappearance of the induration than occurs with alum-precipitated toxoid, probably owing to the much lower content of solids. Thus one of the undesirable effects of alum-precipitated toxoid is almost entirely absent when protamine toxoid is used. This does not necessarily mean that the site of the injected protamine toxoid fails to act as a reservoir from which toxoid is slowly liberated over a period of time, a behavior to which the immunizing power of alum-precipitated toxoid is ascribed. The antitoxin titers of the serums of guinea pigs immunized with protamine toxoid, when measured at intervals up to a year and a half, suggest a gradual release of the toxoid. It is also important that a second injection of protamine toxoid results in a sharp rise in the level of antitoxin.

In spite of the good results in guinea pigs and the very high percentage of children whose reaction to the Schick test was converted from positive to negative after a single injection of protamine toxoid, it is felt that children should receive two injections of 1 cc. (25 Lf units) each at an interval of one month. The so-called booster dose after three years should also be administered. Adults should likewise be given 2 cc. Until more data are accumulated to indicate that the precaution is unnecessary, it will perhaps be advisable to perform the "sensitivity" test before injecting 1 cc. as a first dose in adults. For children this is unnecessary.

SUMMARY

A description of a method of preparing protamine toxoid for inoculation against diphtheria has been given.

A single injection of 1 cc. (25 Lf units) in guinea pigs elicits approximately 2 to 3 units of antitoxin per cubic centimeter of pooled serum in four weeks. Titrations at intervals indicate that the animals' serum still contains several tenths of a unit of antitoxin per cubic centimeter of serum after one and one-half years.

Observations made after intradermal injection in human adults of the new preparation and of the currently used alum-precipitated and "fluid" toxoids show that the new toxoid produces much less erythema than either of the others.

The reaction following each of two or three subcutaneous injections in 39 adults of quantities from 0.25 to 1 cc. has been recorded. Nine of these subjects reacted positively to the Schick test before the injection and negatively between forty-seven and sixty-one days after the last dose. Nineteen more adults on whom the "sensitivity" test had not been done each received one or more doses (0.25 to 1 cc.) of protamine toxoid. Of these only 5 had received the Schick test immediately before the injection. When these 5 were retested after the injections of protamine toxoid, 4 reacted negatively; the fifth, who had received only 0.25 cc. of toxoid, again reacted positively.

No systemic reaction occurred in any of these subjects. Local reactions consisted of erythema and induration; in no case was the reaction sufficient to restrict motion of the arm, in spite of the fact that 15 of 21 subjects (table 2) had areas of erythema greater than 12 by 12 mm. in response to the "sensitivity" test and that all but 1 in a group of 18 who received 0.02 cc. of a 1 to 10 dilution of alum-precipitated toxoid intradermally also had areas larger than this.

Recently we have encountered, in a new group of 17 adults, 13 of whom had extremely mild reactions to 1 cc., 3 subjects whose temperatures rose to 100.5, 101.8 and 102 F. twenty-four hours after a first injection of 0.25 cc. The next morning the temperatures of the last 2 subjects were normal; that of the first was not taken. A second injection of 0.25 cc. six weeks later produced no rise of temperature in this subject. A "sensitivity" test in which only 40 per cent of the standard amount of "fluid" toxoid and an equivalent amount of alum-precipitated toxoid were injected had indicated that all 3 subjects were extremely sensitive.

In approximately 2,600 children between the ages of 9 months and 13 years (the majority were between 9 and 12 months old) each of whom received 1 cc. of protamine toxoid subcutaneously, only a little erythema and induration were observed. None gave evidence of a systemic reaction, nor did sterile abscesses develop in any. All of these children had received the Schick test before the injection of toxoid. Two hundred and thirty-eight have since been tested after an interval of two and one-half to three months, and 230 of the retests gave negative results. Of the 8 children who still reacted positively, 7 reacted negatively three months after a second dose, while 1 required three doses before reacting negatively. One hundred and nine children who originally reacted positively to the Schick test reacted negatively six to nine months after a single injection of 1 cc. (25 Lf units). About 750 children have received a second injection of protamine toxoid. The reaction was the same as after the first dose.

After the injection of 1 cc. of protamine toxoid in each of 28 children, all of whom had some antitoxin at the time, a sharp rise in antitoxin occurred when this was measured four and one-half months after the injection.

Lederle Laboratories, Inc., Pearl River, N. Y. (Dr. W. G. Malcolm, director) gave financial aid in this work. Physicians of the New York City Health Department, especially Dr. Bluma Lipshitz, assisted in the immunization of the children.

ABSTRACT OF DISCUSSION

DR. ERNEST L. STEBBINS, New York: It is a pleasure to have the opportunity to discuss Dr. Ross's paper and to comment on the prospects for the development of a new antigen for immunization against diphtheria. Fifteen years ago physicians felt that they had a satisfactory knowledge of diphtheria and of the means of treatment and of prevention. The very fact that during the past fifteen years there has been a rapid development of new antigens for immunization against that disease proves clearly, I think, that the ideal antigen has not as yet been discovered.

There has been fairly general agreement that use of alum-precipitated toxoid is definitely the method of choice of immunization. There is little criticism as to the percentage of persons treated that are rendered immune as measured both by antitoxin titration methods and by actual experience with exposure to the disease. There are certain disadvantages in the use of alum-precipitated toxoid, however. Its restriction to younger children is a minor limitation on its use, but definitely a limitation. There are occasions when immunization of older children and of adults is desirable, and the reaction to the alum-precipitated toxoid interferes with the use of this antigen for that purpose. Then, too, even in younger children the persistent nodule and the rare occurrence of abscess are a disadvantage. Because of the limited number of persons treated and later subjected to antitoxin titrations, the results, while suggestive of definite value, are not, in my opinion, entirely conclusive. A considerable number of the experiments in which titration was done before immunization and after immunization showed that the subjects had had antitoxin before the administration of protamine toxoid.

If subsequent experience indicates that persons with little or no antitoxin prior to immunization show an equally prompt and satisfactory response to the immunizing treatment, there will be much more ground for a change of opinion as to the most desirable agent to use. The evidence seems to be conclusive that the protamine toxoid does produce less serious local and systemic reaction both in older children and adults and in younger children. This is a distinct advantage, and if the potency of the antigen and the production of immunity as measured by antitoxin titration are satisfactory and if the duration of the immunity is comparable to that of the immunity produced by alum-precipitated toxoid, this should mean a definite advance in the means of immunizing against diphtheria.

CONGENITAL ANOMALIES OF THE LOWER PART OF THE RECTUM

ANALYSIS OF SIXTEEN CASES

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Congenital anal and rectal malformations are uncommon, occurring in but 1 of about 5,000 infants.[1] There are many reports of these conditions, but only since 1934, when Ladd and Gross published their classification,[2] has a logical and practical consideration of the subject been feasible. It has been my privilege to review and study the cases of 16 patients with anomalies of this type who were admitted to three hospitals in New Orleans (Charity Hospital, Touro Infirmary and Southern Baptist Hospital) during the past four years.

EMBRYOLOGY AND PATHOGENESIS

A study of the normal development of this region is necessary in order to understand the pathogenesis of malformations of the anus and rectum.

In the embryo of 5 weeks the portion of the urogenital sinus that is to form the trigone of the bladder is continuous, below the point at which it receives the Wolffian ducts, with the cloaca, a terminal cavity common to the urogenital and intestinal tracts. The cloaca is narrow, laterally compressed and closed caudally by the seamlike cloacal membrane. The intestinal tube extends beyond the cloaca toward the tail as the minute caudal intestine. In each lateral wall of the cloaca there is an external longitudinal groove, with a corresponding internal ridge. By the obliteration of the intervening space, the genitourinary and intestinal portions of the cloaca are later differentiated.

In the embryo of 6 weeks further progress toward separation of the urogenital sinus and the intestine is seen. Separation takes place in two ways. By downgrowth of the urorectal septum (a saddle-like strip of mesoderm) the opening between the two systems may be reduced to a small cloacal duct. Separation may be accomplished also by coalescence of the lateral walls along the longitudinal grooves, allowing mesenchyme to grow across the cloaca. Since the mesenchymal bridge may appear from different parts of the longitudinal groove, variations in the level of the cloacal duct result. If mesenchyme grows across the cloaca at several levels there may be intervening gaps through which the rectum and the urogenital sinus communicate. Normally, the process of separation obliterates all such communications by the seventh week.

Late in the seventh week a primary perineum is established by division of the cloacal membrane into an anterior urogenital membrane and a posterior anal membrane and by downgrowth and spreading of the mesenchymal elements between these. At the same time the urogenital sinus acquires an external opening, although the anal membrane does not rupture until later. Invagination pocketing of the anal pit occurs, forming the proctodeum, and continues until the lumens of the proctodeum and the rectum are joined by rupture of the anal membrane. There is some variation, but this rupture usually takes place during the eighth week.

In young embryos the rectal tube appears as a spindle-shaped swelling that persists in modified form until birth. An upper enlargement, the bulbus analis, has a position corresponding closely to that of the adult rectal ampulla. Its walls become invaginated to form longitudinal folds and ridges, the rectal columns. Caudally there is a second swelling, much shorter and less well differentiated, the bulbus terminalis. This swelling is distinct for only a short time, and the region develops into the zona intermedia.

Many rectal and anal malformations may be due to arrests or abnormalities of development during the seventh or eighth embryonic week. Anomalous connections between the rectum and the genitourinary apparatus occur if the cloacal duct fails to close. Rectoperineal fistulas are probably formed by obliteration of the anterior or ventral portion of the cloacal duct with persistence of the dorsal portion; dissolution of the cloacal membrane then results in an external perineal opening.

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1. David, V. C.: Embryology and Malformations of the Rectum, in Nelson Loose Leaf Surgery, New York, Thos. Nelson & Sons, vol. 5, p. 161.

2. Ladd, W. E., and Gross, R. E.: Congenital Malformations of the Anus and Rectum, Am. J. Surg. **23**:167, 1934.

In a female fetus connections between the ctum and the genital tract are undoubtedly rmed during the descent of the region of at- chment of the müllerian ducts to the posterior ll of the urogenital sinus; the ducts assume y fistulas already existing between the rectum d the urogenital sinus. Such fistulas may nnect the rectum with the vagina or the uterus, mmonly the former.

Congenital stenosis may occur at the anus or to 4 cm. higher. Partial obstruction at the al site results from incomplete rupture of the embrane, and a membranous imperforate anus sults from persistence of the anal membrane. ectal stenosis may result from incomplete de- lopment of either the bulbus analis or the lbus terminalis. In abnormalities in which e rectum ends blindly at a considerable dis- nce above the imperforate anus, the embryonic igin is not clear. Possibly the obliterative ocess that normally occludes the tailgut may normally involve the posterior part of the paca and thereby be responsible for such a ndition. When the anus and the anal pouch e normal but the rectum ends blindly, it is obable that obliteration occurred at the upper lbus analis.

It should be pointed out that the presence of e external anal sphincteric muscle is not de- ndent on the presence of the terminal portion the bowel, as the muscle develops from e regional mesenchyme. Hence, the external hincteric muscle may be present with any mal- rmations described here.

TYPES OF MALFORMATIONS

Many classifications have been advanced to ver the various rectal malformations. Boden- auer,[3] in 1860, was the first to make a sys- matic classification of anomalies of the rectum. all[4] in 1887, Keith[5] in 1908, Fraser[6] in 1926, itchet[7] in 1926 and Crowell and Dulin[8] in 940 published classifications. However, the ost logical and practical grouping is the follow- g, suggested ten years ago by Ladd and ross[2]:

Type 1. Incomplete rupture of the anal membrane or stenosis at a point 1 to 4 cm. above the anus.

Type 2. Imperforate anus due to a persistent anal membrane.

Type 3. Imperforate anus with the rectal pouch separated from the anal membrane. The rectal pouch is a closed sac.

Type 4. Normal anus and anal pouch with a blind rectal pouch. There is either membranous obstruction or considerable separation between the two pouches.

Of 16 patients studied recently, 4 (25 per cent) had anomalies of type 1. Two of the 4 had incomplete rupture of the anal membrane, and 2 had congenital stenosis of the anus and the lower part of the rectum.

No simple type 2 malformations were recorded at the three hospitals during the period of this study. Perhaps they occurred, but were treated so easily and satisfactorily by the obvious expedient of simply rupturing the membrane that neonatal stay in the hospital was not extended beyond the usual period and no further medical interest was aroused.

Eleven patients (68.7 per cent) had type 3 malformations. In this as in other series, anomalies of this type are the most common by far.

The remaining patient seems best considered as having anomalies combining types 1, 2 and 4. There were an imperforate anal membrane, stenosis of the anal canal and a normal rectum separated from the sigmoid flexure by a membrane.

SYMPTOMS AND PHYSICAL SIGNS

Since all rectal anomalies except those of type 1 produce intestinal obstruction from birth, they are usually recognized in the first few hours or days. Rarely, the only complaints are those referable to obstruction, such as refusal to nurse, persistent vomiting or abdominal distention. More often, some one notes that there is no anal opening, that no meconium is passed or that it comes from an abnormal exit, such as the vagina, the urethra or a perineal fistula. The abnormality may even be overlooked until, on the second or third day, unsuccessful attempts are made to take the rectal temperature or give an enema. Here it should be emphasized that physical examination of all infants should always be carried out shortly after birth, in order to make an early diagnosis of these and other equally obvious conditions. In infants older than 24 or 48 hours complete occlusion produces features of obstruction of the lower part of the bowel, such as abdominal distention, vomiting,

3. Bodenhauer, W.: A Practical Treatise on the tiology, Pathology and Treatment of the Congenital alformations of the Rectum and Anus, New York, . S. & W. Wood, 1860.

4. Ball, C.: The Rectum and Anus, London, Cassell Co., 1887.

5. Keith, A.: Malformations of the Hind End of e Body, Brit. M. J. **2**:1736, 1908.

6. Fraser, J.: Surgery of Childhood, New York, Villiam Wood & Company, 1926, vol. 2.

7. Fitchet, S. M.: Imperforate Anus, Boston M. & . J. **195**:25, 1926.

8. Crowell, E. A., and Dulin, J. W.: Congenital nomalies of the Anus and Rectum, Surgery **7**:529, 940.

borborygmus, increased irritability and dehydration, with eventual circulatory or respiratory collapse. For patients with a simple bulging, discolored anal membrane (type 2), the diagnosis is obvious and the treatment is usually completed at once. In patients with anal stenosis or large associated fistulas, the signs of intestinal obstruction may be less evident or may even be missed completely. The perineum often bulges downward when the child strains to defecate, and a ribbon-like stool may be noted.

ROENTGEN FINDINGS

In 1930 Wangensteen and Rice [9] published a description of a method of determining the position of the blind rectal pouch in patients with imperforate anus. The infant is inverted, and a flat roentgenogram of the abdomen and pelvis is taken, with an opaque marker in the anal dimple or at its usual site. Gas in the intestine rises and outlines the rectal pouch, giving an indication of its position with relation to the external surface of the perineum and the marker. However, this technic has limited value during the first twenty hours of life, because gas has not yet proceeded far enough in most instances to give good visualization.

Roentgen examination is useful in another way. Prior to a plastic perineal operation on patients for whom a defunctionalizing colostomy has previously been performed, barium sulfate or iodized oil can be injected into the distal loop of the intestine to facilitate accurate localization. This procedure, of course, also aids in tracing fistulous communications, especially when combined with fluoroscopic examination.

Berman [10] recommends the use of the fluoroscope as an aid in diagnosis, especially for infants during the first twenty-four hours after birth. By moving the infant into various positions and by gentle massage of the abdomen gas may be forced into the blind pouch of the rectum. The position is then determined in relation to bony landmarks or is marked by metal arrows fastened to the skin with adhesive tape.

ASSOCIATED ANOMALIES

The anomaly most commonly associated with congenital malformations of the anus and rectum is fistula. The types of fistula commonly found in male infants are (1) rectovesical, (2) rectourethral and (3) rectoperineal. In female infants (1) rectovaginal fistulas, (2) rectovesical fistulas, (3) fistulas between the rectum and the fossa navicularis and (4) rectoperineal fistulas are associated with rectal anomalies.

Eleven of the 16 patients in this series (68.7 per cent) had fistulas. None of the patients with rectal anomalies of type 1 had fistulas, but 10 of the 11 with type 3 anomalies had an associated fistula, as did the patient with "mixed" anomalies. Six had rectovesical fistulas; 3 had rectourethral fistulas, and 2 had rectovaginal fistulas.

Of Berman's [10] 23 patients, 13 (56.5 per cent) had associated anomalies other than fistulas. Four had multiple (two to four) anomalies; the others had single anomalies. Ladd and Gross reported 162 cases, in 43 (26.0 per cent) of which there were other anomalies, in some as many as eight. In 12 cases the associated anomaly was the cause of death.

Eleven patients (68.7 per cent) of the group studied here presented associated anomalies other than fistulas. Defects which occurred are listed in the accompanying table. Four of the patients had single anomalies, while 7 had two to five. Only 2 of the 4 patients with type 1 rectal anomaly had other abnormalities, and in each the single malformation was minor. The incidence was much higher in patients with type 3 rectal abnormalities; 8 of 11 had one or more additional defects. The patient with "mixed" rectal anomalies presented multiple associated defects as well, the fistula between the lower part of the rectum and the neural canal being one of the most unusual.

TREATMENT

The treatment of rectal and anal malformations varies with the type of anomaly and the age of the child. It is not the purpose of this paper to describe the various surgical technics employed. For this the reader is referred to articles by Ladd and Gross,[2] Crowell and Dulin,[3] Harken [11] and Berman.[10] It can be stated dogmatically that all treatment depends on accurate diagnosis.

Type 1. In the treatment of abnormalities of type 1 repeated dilation of the stricture with dilators of various types or with a finger usually suffices to overcome the obstruction. Treatment should be continued for several weeks or months as necessary. When the opening in the anal membrane is small, obstruction may be relieved by a cruciate incision followed by dilation.

Type 2. Simple cruciate incision of the membrane followed by regular dilation is all that

9. Wangensteen, O. H., and Rice, C. O.: Imperforate Anus, Ann. Surg. **92:**77, 1930.

10. Berman, J. K.: Congenital Anomalies of the Rectum and Anus, Surg., Gynec. & Obst. **66:**11, 1938.

11. Harken, D. E.: Congenital Malformations of the Rectum and Anus, Surgery **11:**422, 1942.

essary in the treatment of rectal abnormalities ype 2.

Type 3. The treatment of type 3 abnormal- s depends on the position of the rectal pouch. mediate mobilization of the rectal pouch and ctostomy by the direct perineal approach he method of choice if the pouch is readily essible. If it cannot readily be reached in manner, a colostomy in the transverse colon uld be made and plastic repair of the perineal ion performed after three or four years.

Careful training helps to overcome this condition. Wreden [12] and Stone [13] have suggested a plastic operation for this distressing complication.

Another complication which may follow surgical treatment of malformations of the anus and rectum is cicatricial anal stenosis. Cole and Greeley [14] have suggested utilization of pedicle skin grafts in the correction of such a complication.

Three of the 4 patients with type 1 anomalies received dilation, with good results for 2

Data for Sixteen Cases of Congenital Rectal Anomaly

pe of anomaly (according to Ladd and Gross [2])	I				III											I, II, IV	
e number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
x of patient																	
Male	+	+	..	+	+	+	..	+	..	+	+	..	+	+	+	+	12
Female	..	..	+	..	..	..	+	..	+	..	..	+	..	..	..	..	4
ce of patient																	
White	..	+	..	+	+	+	..	+	+	+	+	+	+	+	+	+	13
Negro	+	..	+	..	..	..	+	..	..	..	..	..	..	..	..	..	3
tula																	
Rectovesical	..	..	..	..	..	..	..	+	..	+	+	+	..	+	+	..	6
Rectourethral	..	..	..	..	..	+	..	..	..	..	..	..	+	..	..	+	3
Rectovaginal	..	..	..	..	..	..	+	..	+	..	..	..	..	..	..	..	2
Between rectum and neural canal	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+	1
her associated anomalies																	
Sacrococcygeal dimple	..	..	..	..	+	+	..	..	..	..	..	..	..	..	+	..	3
Aural deformity	..	+	..	..	..	..	+	..	..	..	..	..	..	..	..	..	2
Umbilical hernia	..	..	..	+	..	+	..	..	..	..	..	..	..	..	..	..	2
Spina bifida	..	..	..	..	..	+	..	..	..	..	..	..	..	..	..	+	2
Enlarged heart	..	..	..	..	..	..	+	..	..	+	..	..	..	..	..	..	2
Anomaly of sacrum	..	..	..	..	..	..	..	..	..	..	..	+	..	..	+	..	2
Imperforate urethra	..	..	..	..	..	+	..	..	..	..	..	..	..	..	..	..	1
Dextrocardia	..	..	..	..	..	..	+	..	..	..	..	..	..	..	..	..	1
Hermaphroditism	..	..	..	..	..	..	..	..	..	+	..	..	..	..	..	..	1
Anomaly of ribs	..	..	..	..	..	..	..	..	..	+	..	..	..	..	..	..	1
Malformed vertebrae	..	..	..	..	..	..	..	..	..	+	..	..	..	..	..	..	1
Atelectasis of left lung	..	..	..	..	..	..	..	..	..	+	..	..	..	..	..	..	1
Undescended testis	..	..	..	..	..	..	..	..	..	..	+	..	..	..	..	..	1
Unclassified heart condition	..	..	..	..	..	..	..	..	..	..	+	..	..	..	..	..	1
Absence of vagina	..	..	..	..	..	..	..	..	..	..	..	+	..	..	..	..	1
Stenosis of colon	..	..	..	..	..	..	..	..	..	..	..	+	..	..	..	..	1
Bilateral five fingers, no thumbs	..	..	..	..	..	..	..	..	..	..	..	..	+	..	..	..	1
Hydrocele	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+	1
Total recognized associated anomalies	0	1	0	1	1	4	3	0	0	5	2	3	1	0	2	2	25
eatment																	
Immediate perineal plastic operation	..	..	..	..	..	+	..	+	++	..	+	..	+	..	..	..	5
Colostomy	..	..	..	..	+	..	..	..	+	..	..	+	..	+	+	+	6
Dilation	+	+	+	..	..	..	..	..	..	+	..	..	..	..	..	..	4
Later perineal plastic operation	..	..	..	..	++	..	..	..	..	..	..	..	..	..	..	..	1
Fistula closed later	..	..	..	..	..	+	..	..	..	..	..	..	..	..	..	..	1
No specific therapy	..	..	..	+	..	..	+	..	..	..	..	..	..	..	..	..	2
esent status																	
Good anal function	+	+	..	..	..	+	..	+	..	..	+	..	..	..	..	..	5
Fair anal function	..	..	+	+	+	..	..	..	..	..	..	..	..	..	..	..	3
Patient well, but plastic work to be done	..	..	..	..	..	..	..	+	..	..	..	+	..	+	..	..	3
Died from an associated anomaly	..	..	..	..	..	..	+	..	..	+	..	..	..	..	+	+	4
Died from the anal anomaly	..	..	..	..	..	..	..	..	..	..	..	..	+	..	..	..	1
Died from unrelated cause	..	..	..	..	..	..	..	..	+	..	..	..	..	..	..	..	1

Type 4. Anomalies of the fourth type are e most difficult to treat because the rectal uch is frequently so high in the pelvis that it is rd to reach by the perineal approach. Pre- minary colostomy is often necessary. If the struction is membranous, incision and dilation om below may suffice.

If fistulas are present, they are usually best ft undisturbed during infancy.

Unfortunately, anal incontinence of varying egree follows reconstruction in some instances.

and fair results for 1 of them. The fourth patient left without receiving specific therapy.

Five patients with type 3 anomalies had immediate perineal plastic operations. Two of them

12. Wreden, R. R.: A Method of Reconstructing a Voluntary Sphincter Ani, Arch. Surg. **18**:841 (March) 1929.

13. Stone, H. B.: Plastic Operation for Anal Incontinence, Arch. Surg. **18**:845 (March) 1929.

14. Cole, W. H., and Greeley, P. W.: Utilization of Pedicle Skin Grafts in Correction of Cicatricial Anal Stenosis, Surgery **12**:349, 1942.

can be considered completely normal, now having good anal function. One died shortly postoperatively, and 1 died later of an unassociated cause. The fifth patient has good anal function, but an associated fistula remains to be closed.

Of 4 patients with type 3 anomalies who had colostomies soon after birth, 1 has had two subsequent perineal plastic operations and has fair anal function at present. One died later from an infection of the urinary tract. The other 2 await future plastic perineal repair.

Fig. 1.—Diagram of the condition in case 1; rectal anomaly of type 1, with incomplete rupture of the anal membrane.

One patient with a type 3 malformation died of associated anomalies; the remaining patient in this group was treated by dilation of the opening of a cloaca-like cavity and died after leaving the hospital before treatment had been completed.

The patient with "mixed" anomalies presented a hopeless condition from birth because of multiple anomalies. He died after a palliative cecostomy.

To summarize the results, 6 of 16 patients died. The results were good or fair in all patients with type 1 anomalies who were treated. Of 6 patients with type 3 anomalies who are living, treatment has been completed for 3, with good results in 2 and fair anal function in the third. The other 3 still need further plastic perineal repair.

REPORT OF CASES

Anomalies of Type 1

CASE 1.—A Negro boy 18 months old was admitted to Charity Hospital of New Orleans in November 1941, because of painful, difficult defecation. His appetite had always been good, and he had "never been sick." Physical examination revealed no abnormalities except a small elliptic anus partially occluded by a diaphragm-like margin. Roentgenograms taken after the child had been given an enema of barium sulfate showed no filling defect or deformity of the colon or rectum. After examination and dilation, the patient was discharged from the hospital and had no difficulty for six weeks, when pain and tenesmus recurred. He was then readmitted, and the anal slit was found to be too sm to admit the tip of a little finger. Simple digital di tion was repeated, and the patient has defecated re larly without difficulty ever since.

CASE 2.—B. L., a white boy born in Touro I firmary in March 1942, had an almost imperforate a and a deformity of the right ear which were noted birth. Roentgen examination of the inverted b seven and forty-eight hours after birth showed diff distention of the gastrointestinal tract to a point cm. from a marker at the anal dimple. Howev further studies made after the introduction of contr material through the tiny anal orifice indicated t the obstruction was incomplete, probably consisting a diaphragm-like membrane with a small central ap ture. After daily dilation of the rectum with cathet the distention was controlled, and the patient had further difficulty. He was discharged with instructi for continued dilations at home. No follow-up observ tions could be secured.

CASE 3.—B. C., a 3 year old Negro girl, was a mitted to Charity Hospital of New Orleans in Ju 1942, because she had been unable to defecate duri the last month. Since birth intestinal evacuation h been difficult; enemas had been used at least week during the child's entire life. Her appetite had be good, and there was no vomiting. She was well d veloped and fairly well nourished and presented t classic signs of megacolon. The anus was too sm to admit the little finger. After digital dilation an cleansing enemas, intestinal elimination was regula though occasional enemas are still necessary, the chi no longer has unusual enlargement of the abdomen other features of megacolon.

CASE 4.—K. S., a 16 month old white boy, was a mitted to Touro Infirmary in January 1943, with complaint of "constipation." At birth he had had almo complete anal atresia. Since that time he had h "ribbon stools" once weekly, and frequent enemas ha been necessary. At the age of 9 months he had had a

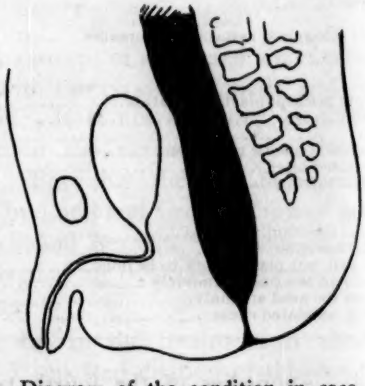

Fig. 2.—Diagram of the condition in case 3; rect anomaly of type 1, with congenital anal stenosis.

operation to enlarge the anal orifice at another ho pital, but this gave no relief. He cried during defec tion; his abdomen was protuberant, and abdominal e amination showed the classic features of well develope megacolon, together with a large umbilical herni The anal orifice would barely admit the tip of a litt finger, and fecal impaction was present. He was re moved from the hospital the following day witho treatment, and no follow-up observations could b secured.

omalies of Type 3

Case 5.—D. B., a 4 year old white boy, was admitted to Charity Hospital of New Orleans in September 1942. At birth an imperforate anus had been noted, and a colostomy was done the next day. The artificial opening had functioned well. At the time he was admitted, the colostomy opening was evident in the right upper quadrant. Anal and sacrococcygeal dimples were present. A week later a perineal dissection was carried 5 inches (12.5 cm.) deep. The blind rectal pouch was identified, mobilized, brought down and sutured to the margin of the skin. After a second

Fig. 3.—Diagram of the condition in case 6; rectal anomaly of type 3, with a rectourethral fistula and an imperforate urethra.

perineal plastic operation, performed two months later, the rectal pouch was opened, and five months later the colostomy was closed. Subsequent dilation has been necessary, and careful training is gradually correcting the patient's moderate anal incontinence.

Case 6.—E. S., a white boy of 2 days, was admitted to Charity Hospital of New Orleans in October 1941, when absence of the anus was first noted. Physical examination showed a well developed infant who was jaundiced, cried a great deal and had severe abdominal distention. An anal dimple was present. Roentgen observation with the infant inverted showed the gas-filled rectal pouch to be 3 cm. from the dimple. By perineal dissection the rectal pouch was identified, mobilized, brought down, sutured to the margin of the skin and opened. No fistula was found, but a small anterior pouch was tied and cut. Pyelograms made later failed to show a communication between the rectum and the urinary tract, though the child voided through the incision from the beginning, never through the urethra. When the infant was readmitted to the hospital a year later, his development had been normal. His appetite had been good, but he had had constipation and tenesmus. His anus was dilated to the size of an adult middle finger. A small umbilical hernia was present; he had a sacrococcygeal dimple, and roentgen examination revealed spina bifida. Pyelograms and proctoscopy demonstrated a rectourethral fistula and a rectal polyp. When he was circumcised, an unsuccessful attempt was made to pass a filiform catheter into the bladder. Later, suprapubic cystostomy was done. Perineal exploration revealed imperforation of the bulbar portion of the urethra for 1 cm. The continuity of the lumen was reestablished over a catheter, and the rectourethral sinus was ligated. Anal and urethral function continue to be good.

Case 7.—J. M., a Negro girl, was born in Charity Hospital of New Orleans in November 1941. Physical examination revealed deformities of both ears, imperforate anus and rectovaginal fistula. Her general condition was poor. Roentgen examination revealed enlargement of the heart, dextrocardia, passive congestion of both lungs and enlargement of the liver. Defecation through the vagina was normal. After symptomatic treatment for two weeks, she was discharged from the hospital. When she was readmitted later, the child presented a feeding problem and defecation through the rectovaginal fistula was irregular. No operative procedure was undertaken. The patient became progressively worse and died after nine weeks.

Case 8.—R. T., a white boy 2 days old, was brought to Charity Hospital of New Orleans in May 1942, when it was noted that there had been no intestinal elimination, that the baby cried excessively, that he was distended and that there was no anal opening. There had been no vomiting. Physical examination revealed absence of an anus or anal dimple; no other abnormalities were noted. Roentgenograms of the inverted infant showed a blind rectal pouch well above the levator muscles. Catheterization showed no meconium in the urine. The rectal pouch was located by perineal dissection at a depth of 3 cm.; it was mobilized, brought down, sutured to the margin of the skin and opened. The child was asymptomatic when he was discharged from the hospital three weeks later. Prior to the readmission of the patient one month later, the stools became much smaller, and tenesmus was obvious. Examination showed a malnourished, anemic infant with a distended abdomen. Feces and urine were passed from the urethra as well as through the small, tight anal opening. Dilation of the rectum with catheters daily for two weeks produced complete relief of symptoms and diminution of fecal admixture in the urine. Occasional dilation was continued at home, and the child has had good anal function ever since. The rectovesical fistula is to be corrected when he is older.

Fig. 4.—Diagram of the condition in case 9; rectal anomaly of type 3, with a rectovesical fistula.

Case 9.—W. B., a white girl 3 weeks old, was admitted to Southern Baptist Hospital in September 1943. There was no anus or anal dimple. A rectovaginal fistula was present, through which the infant had defecated since birth; there were no signs of intestinal obstruction. By the perineal approach the rectum was located, mobilized, brought down, sutured to the margin of the skin and opened. Another perineal plastic operation was performed a month later, when it was found that the rectum had retracted and the perineum had healed over. Stools were still passed through the vagina, but the child now presented signs of partial

obstruction. Because the perineum again began to heal over, a colostomy was performed. The fistula functioned well. Six weeks later meningitis developed, and the infant died one day after readmission to the hospital. Autopsy showed a well functioning colostomy opening; the perineum was closed over, and a rectovaginal fistula opened into the upper third of the vagina. No other anomalies were present. The diagnosis of pneumococcic meningitis was confirmed bacteriologically.

CASE 10.—H. C., a white boy 8 hours old, was admitted to Charity Hospital of New Orleans in July 1940. The scrotum was well developed on the right side and contained a normal-sized testicle; the left side of the scrotum was rudimentary, resembling a labial fold, and contained no testicle. The penis was small and anomalous in appearance. One and five-tenths centimeters posterior to the penis was a pinpoint opening from which meconium and urine were extruded; there was no anus or anal dimple. Mechanical dilation was carried out daily until the aperture was 1 cm. in diameter. Both urine and feces were passed through this common opening almost continuously, and there seemed to be no sphincter action. Roentgen examination of the chest showed bizarre irregularities of the ribs, hemivertebrae, absence of vertebrae, enlargement of the cardiac shadow and partial atelectasis of the left lung. Unexplained alternating severe diarrhea and constipation developed, which did not respond to symptomatic measures. The infant died when he was 3 months old. An autopsy was not done.

CASE 11.—R. P., a white boy, was born in Charity Hospital of New Orleans in September 1942. At routine examination an imperforate anus was found. There was also a rough systolic murmur over the entire precordium; the left testicle was undescended, and meconium passed through the urethra with urine. Roentgen examination of the inverted infant at the age of 6 hours showed the gas-filled rectal pouch 2 cm. from the marker. The pouch was located by perineal dissection, freed, pulled down, sutured to the skin and opened. A week later the pouch had to be resutured to the edges of the skin, and there was secondary maceration with infection of the surrounding skin, which healed slowly. After two months in the hospital, the infant was discharged, only to be readmitted six weeks later because of progressive constipation. Formed stools were passed infrequently and with extreme pain. There had been no vomiting; the appetite was excellent, and the gain in weight was adequate. A stricture was found just inside the anal opening, and it was gradually dilated. Now, though frequent dilation is still necessary, the infant appears well and has regular habits of defecation. The action of the anal sphincter appears to be normal.

CASE 12.—J. B., a white girl, was admitted to Touro Infirmary shortly after birth, in August 1943. Physical examination showed absence of the anus or anal dimple, well formed labia, complete absence of the vaginal orifice and enlargement of the clitoris and urethra. Meconium passed through the urethra. Early roentgenograms were not diagnostic, though it appeared that the rectal pouch was separated from the expected anal site by about 6 cm. The right transverse processes of the second and third sacral vertebrae were not visualized. The following day a Devine colostomy was made in the transverse colon. The postoperative course was slow, with difficulty in feeding and maceration of the skin adjacent to the colostomy opening. Studies with diodrast as the contrast medium showed irregularity in the contour of the bladder. The dye entered the intestine. No further attempt was made to localize the fistula, and for two months the baby progressed normally. She was then readmitted because of an infection in the upper respiratory tract. Straining and coughing had caused herniation of the distal intestinal loop on the anterior abdominal wall at the site of the colostomy. The distal loop was easily reduced. After the infection of the respiratory tract subsided, iodized oil instilled into the distal loop showed a small irregular lumen with two areas of constriction in the transverse colon. The distal portion of the colon or rectum ended in a conical constriction that was connected to the neck of the bladder by a fine filiform tract. After the demonstration of the rectovesical fistula, the distal loop was closed and replaced. The subsequent course has been uneventful, and further investigation and plastic operations will be undertaken later.

CASE 13.—B. S., a white boy, was sent to Charity Hospital of New Orleans two days after birth, in April 1943, with a diagnosis of imperforate anus. He was greatly distended and dehydrated, vomited excessively and appeared moribund. Examination showed probable pneumonitis. There was an icteric tinge to the skin; the saliva was yellowish, and there were hemorrhages in the conjunctivas. Only a small dimple and a small tag of skin marked the anal site. There were five fingers on each hand but no thumbs. Roentgen examination of the inverted infant showed the gas bubble 1.5 cm. from the expected anal site. After preliminary infusion of isotonic solution of sodium chloride and blood, the rectal pouch was located by perineal dissection, mobilized, brought down, sutured to the edges of the skin and opened. A rectourethral fistula was encountered and closed. The urethra was inadvertently divided and was repaired. The postoperative condition was poor, and the baby died six hours later. An autopsy was not secured.

CASE 14.—R. T., a white boy 2 days old, was admitted to the Charity Hospital of New Orleans after hom

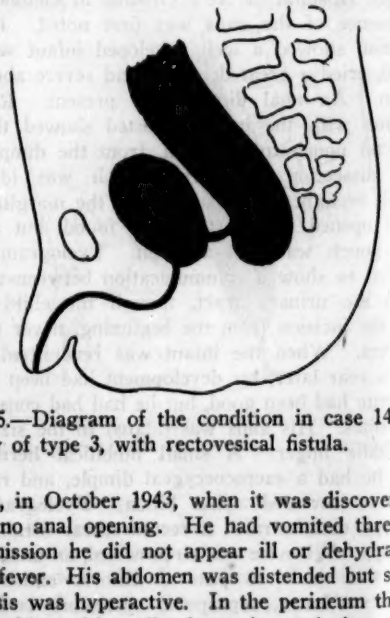

Fig. 5.—Diagram of the condition in case 14; rectal anomaly of type 3, with rectovesical fistula.

delivery, in October 1943, when it was discovered that he had no anal opening. He had vomited three times. On admission he did not appear ill or dehydrated and had no fever. His abdomen was distended but soft, and peristalsis was hyperactive. In the perineum there was a small ridge with a dimple at the anal site; no other abnormalities were noted. Roentgen examination of the inverted infant showed the rectal pouch to be 9 cm. from the anal dimple. The urine was brown and contained meconium and lanugo hairs. A Devine colos-

my was made in the transverse colon. Subsequently, stourethrograms made after injection of methylthionine chloride (methylene blue) into the distal portion the colon established the presence of a rectovesical tula. The colostomy has functioned well since the tient was discharged from the hospital, and plastic pair is contemplated for a later date.

CASE 15.—E. T., a white boy, was born at Charity ospital of New Orleans in February 1943. No anus anal dimple was present. Over the lower part of e sacrum was an indentation, and deep beneath it a ny defect was palpable. Roentgen examination of the verted infant at the age of 12 hours showed the rectal uch to be 4 cm. from the expected anal site. A evine colostomy was made in the transverse colon ith a good functional result, and the patient was disarged from the hospital three weeks later. At the e of 2 months he was readmitted because of vomiting d diarrhea. He was poorly developed, poorly nourhed and dehydrated. The urine contained fecal matter, d cystograms demonstrated a rectovesical fistula. Six eeks after the infant was readmitted, when the area the colostomy was revised because of increasing disntion, an intra-abdominal communication between the roximal and distal loops of the transverse colon was und. The communication was closed. An infection the urinary tract developed; and despite all suportive therapy the condition of the infant became rogressively worse, and he died at the age of 5 months.

nomalies of Types 1, 2 and 4 Combined

CASE 16.—B. R., a white boy, was born at Touro nfirmary in June 1943; an imperforate anus and a ydrocele were noted at birth. After a blunt instruent was pushed through the membrane at the anal mple, it was assumed that continuity of the rectal men had been established. However, roentgen exmination made when no meconium was passed indited the gas-filled bowel terminating in a blind pouch out 3 cm. proximal to the anal marker and 1.5 cm. nterior to the sacrum. Instillation of iodized oil rough the perforated anal site showed the lower pouch be 3.5 to 4 cm. in depth, extending to the gas-filled op, and adjacent to the sacrum. Oil passed from the ectum into the neural canal through a filiform fistula at the level of the fourth sacral disk, and there was a fistulous communication between the sigmoid flexure and the prostatic portion of the urethra. Meconium was mixed with the urine. The infant's general condition was poor and became progressively worse. A

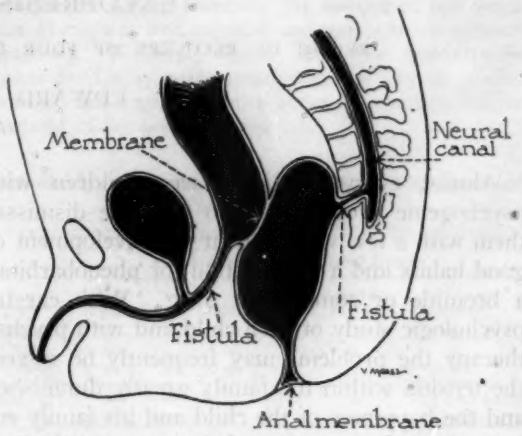

Fig. 6.—Diagram of the condition in case 16; rectal anomalies of types 1, 2 and 4, with a rectourethral fistula and a fistula between the rectum and the neural canal.

cecostomy was done to relieve the intestinal obstruction, but the patient died one day later. Autopsy verified the clinical findings, and a spina bifida occulta was also demonstrated.

CONCLUSION

This review emphasizes the high frequency of fistulas between the rectal and genitourinary tracts associated with deformities of the lower part of the rectum.

Data for some of the cases included in this study were provided by Dr. Alton Ochsner, Dr. Howard Mahorner, Dr. William P. Bradburn, Dr. Charles Bloom and Dr. Lloyd J. Kuhn.

PSYCHOGENIC INCONTINENCE OF FECES (ENCOPRESIS) IN CHILDREN

REPORT OF RECOVERY OF FOUR PATIENTS FOLLOWING PSYCHOTHERAPY

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NEW YORK

Almost every physician sees children with psychogenic problems. Too often he dismisses them with a few words about the development of good habits and a prescription for phenobarbital, a bromide or some other drug. With careful psychologic study of each child and with psychotherapy the problems may frequently be solved, the tension within the family greatly diminished and the happiness of the child and his family enhanced. Also much can be accomplished in safeguarding the child's future mental health.

Among a considerable number of children with psychogenic problems of various types seen by me in the pediatric clinic of Mount Sinai Hospital during one year, there were 4 with encopresis. This condition has been defined by Kanner [1] as "involuntary defecation which is not directly due to organic illness." Four cases of this disorder are reported here, and the subject is discussed with the aid of the available literature.

REPORT OF CASES

CASE 1.—Rose Marie, aged 7 years, was brought to the clinic by her mother because several times recently she had soiled her underwear with feces. The mother had begun training the child in control of the bowels during her first year and had had no difficulty until about a year previously, when a period of soiling had occurred. The mother complained that the girl was "nervous," meaning always restless, that she had outbursts of temper and that she frequently put her fingers into her mouth, without, however, sucking the fingers or thumb or biting the nails.

The girl's weight was slightly above average, and she was physically normal except for defective vision, which was subsequently corrected with glasses. Her intelligence was normal. While sitting on the examining table she was restless, swinging her legs back and forth.

Rose Marie had an older sister of 9 years and a younger sister of 17 months, and the 3 girls quarreled among themselves over toys and other possessions. Rose Marie shared a bed with the older sister, whom she teased and fought with about the bed clothes.

The mother was oversolicitous about the child's health habits, particularly her habits of intestinal elimination, and often administered magnesia magma. She was constantly trying to prevent the child from putting her fingers into her mouth lest the teeth become crook and she did not want Rose Marie to buy sweets as feared that the latter too might injure the teeth. S tried to force the child to drink milk, to eat coo vegetables, although the child preferred them raw, a to take regular meals instead of eating irregular according to her appetite. The mother was constant frustrating the child by forbidding many things, example, taking a toy out of doors. The child w persistent and sometimes had an outburst of temp The mother in turn frequently lost her temper and so times struck the child, though usually she just "yell at her. The mother volunteered the information th she had been "nervous" since the last baby was bo and that the pregnancy was undesired. Occasional the mother called Rose Marie "crazy." The moth claimed that the girl wanted to receive most of h attention and that she suceeded in obtaining as mu as the younger sister. However, the author's impre sion was that the mother did not radiate the real warm of affection that is so important for a child's ment health.

The father, who was seen at a later visit, occasional had a tic affecting the right eye. According to hi also Rose Marie was restless and had tantrums whe she was denied her way. He objected to her puttin her fingers into her mouth, and while in the clinic h showed anxiety when she climbed onto the examin ing table. He confirmed the fact that the mother wa nervous and sometimes struck the child.

Rose Marie's soiling occurred first when her bab sister was about 4 months of age. She once stated tha she knew her little sister was coming before the birth but she would not amplify this statement. As usual after the arrival of the younger sibling the major par of the parents' attention was probably concentrated o the new baby, and Rose Marie objected to this, at time resenting the presence of the infant. This attitude wa overtly expressed, between the second and third vis to the clinic, when Rose Marie was left alone wit the baby while the mother went shopping. On returnin the mother found her striking the baby. Rose Mari explained that the baby was noisy and that she hit i "to make it quiet."

Rose Marie competed with the baby for her parent love, but she was at a disadvantage because the bab was younger. She therefore wished that she were aga a baby. This was indicated when she expressed a wis to sleep in the crib in her parents' room, which sh had used until she was 3 years old and which wa now occupied by the younger sister. She added tha she would not care to sleep in the crib except in her parents' room. At another visit she expressed a de sire to have her father hold her on his lap and carr her about like a baby. As a result of these wishes Rose Marie, in fantasy, was a baby again and soiled her underwear as a baby soils its diapers. However

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1. Kanner, L.: Child Psychiatry, Springfield, Ill., Charles C Thomas, Publisher, 1935, pp. 224-227.

was unconscious of this association until it was icated to her.

Rose Marie was obviously attached to her father, she frankly declared that she loved him more than mother, and felt that he loved her. She had re- tly bought herself a cheap ring, which she was aring. She acknowledged that she would like to have mother's wedding ring and be married to her father. e evidently knew that this was taboo, as a few minutes r she said she preferred a "boy friend" named Harry. a subsequent visit she had a fantasy that her father s married to a nurse and that she herself was married a doctor. This indicated her liking for me and her like for her mother; at the same time, if the two ilar elements in this equation (nurse and doctor) canceled out, her wish to be married to the father indirectly disclosed. This desire, freely expressed at earlier visit, was now repressed and disguised.

At the first visit Rose Marie emphatically stated that mother did not love her and that her mother beat . In answer to questioning, however, she estimated t it was a couple of months since she last was struck; ually the mother just "yelled" at her. Rose Marie not think she deserved the punishment she received. r attitude toward her mother was further revealed a later visit when she related that she had quarreled h a girl of her own age. They were playing "house," d the other girl wanted to be the "mother." This gered Rose Marie because she wished to play that re was no mother. In answer to questioning, Rose arie disclosed that she would want to play that she s 19 years old and that the other girl was 17. She nted her father to be part of this household, but e did not want her mother and sisters. The most phatic "no" was about her mother, and the next st emphatic "no" was about the baby sister. At a er visit Rose Marie claimed that she loved both her rents equally, but she doubted whether her mother ed her even before the birth of the little sister. course this feeling about the mother may have been rtly a projection of the child's jealousy of her.

Rose Marie related quarrels that she had had with r older sister and acknowledged that she hated her ough at times to feel like killing her. She had the me feeling about her teacher and the principal of her hool. However, she received good marks except for nduct. At one visit she expressed the thought that e teacher liked her and that she was the teacher's et," but that the teacher was too fat (like the mother en pregnant) and "yelled" at the children and even lled their hair. Therefore at a later visit she de- red that the teacher "stinks."

Rose Marie exhibited fear of death when she recalled e loss of her uncle and when she told that she once w a dead man and ran away. She was also afraid "dead rats" and "dead cats," perhaps because she d a repressed unconscious urge to kill her baby sister. The child had a frequently repeated dream in which man kidnapped her. The man was roughly dressed, e a tramp she once saw in the neighborhood. One y suspect that the man who stole her was her father sguised.

After her first visit to the clinic there was no recur- nce of the soiling, and at the end of six months, ring which she was seen nine times, Rose Marie was ee of her other nervous symptoms. By the end of ten onths the jealousy with unconscious wishes for death d the overt aggression previously directed toward e baby sister had been replaced at times by mothering. hen the mother struck the baby while training her, ose Marie would immediately kiss and feed her. When she played "house," she at times pretended that the younger sister was her own child and included the baby as well as her father in her fantasied home. The mechanism of such a change, in which an attitude (hate) is replaced by its antithesis (love), is termed reaction formation. Levy [2] included mothering among the manifestations of sibling jealousy. At the end of two years Rose Marie was well adjusted and free from all nervous symptoms. However, during this time her attitude toward her family, made manifest by the way she played "house," had undergone the series of changes briefly indicated in the accompanying table.

Rose Marie's Attitude Toward Her Family as Revealed in Playing "House."

	Members of Fantasied Home					
Date	Rose Marie	Father	Mother	Older Sister	Baby Sister	Others
5/22/42	+	+	—	—	—	Girl friend
2/10/43	+	+	—	—	+	
4/14/43	+	—	+	—	?	
6/15/43	+	—	—	—	—	Boy friend
10/27/43	+	—	—	—	+	Her own baby

+ Signifies that the member was included in the fantasied home.
— signifies that the member was rejected from the fantasied home.

Psychotherapy in this case consisted in making Rose Marie fully conscious of her fantasy of being a baby, her resentment of her two sisters, her jealousy of her mother and her love of her father. At the same time the parents, particularly the mother, were made conscious that they were often unnecessarily frustrating the child's wishes and that in their efforts to follow rules of health they were oversolicitous about the child's physical health to the detriment of her mental health. Also, as a result of treatment the mother on her own initiative tried to make Rose Marie feel as much loved as the baby.

Case 2.—Bertha, who was 7½ years old when she was brought to the clinic, had slept in her parents' bedroom until she was 5½. She was the youngest of 4 children and the only patient in this series with incontinence plus obstipation (obstipatio paradoxa). The mother displayed an obsession about the functioning of the child's bowels shortly after her birth. Suppositories, liquid petrolatum, magnesia magma and other cathartics had been employed constantly. The mother had succeeded in training the child when she was between 2 and 3 years old by placing her on the pot every half-hour, even when on the street. However, shortly after starting school Bertha had increasing constipation plus frequent small involuntary movements. She was admitted to Mount Sinai Hospital, where it was noted that her abdomen was moderately distended with palpable loops of bowel, that her rectum was filled with hard, firm fecal impactions and that there was severe irritative dermatitis around the anus. The impaction was relieved during the first week that the child was in the hospital by frequent administration of oil enemas and digital loosening of the stool in the rectum. During the remainder of her stay in the hospital, while she was separated from her mother, the child's bowels functioned normally and regularly. Roentgenograms of the colon and the entire gastrointestinal tract were normal, as were various laboratory data, including the

2. Levy, D. M.: Studies in Sibling Rivalry, Research Monograph no. 2, New York, American Orthopsychiatric Association, 1937.

Wassermann reaction. Her basal metabolic rate was reported to be subnormal, but there was no increase in the blood cholesterol or blood lipids. Daily administration of 1 grain (0.06 Gm.) of thyroid was started, but since there were no apparent clinical results it was discontinued after several months, when the girl was referred to me because of a recurrence of soiling.

Bertha was unwanted before birth, and even now her mother expressed little warmth of affection, saying "Since she is here, let her live." On another visit the mother volunteered that sometimes when she was annoyed she felt like killing the girl. The child in turn obstinately refused in the clinic to express any love for the mother. The latter was domineering, while the father had a mild disposition. Bertha was more attached to him, though of all her family she now loved her elder brother best. The mother demanded implicit obedience and unnatural quiet from the child, nagged her to go to the toilet and refused to give her various foods eaten by the rest of the family. At any resistance or disobedience on Bertha's part the mother was apt to lose her temper and to scold and strike the child. At times Bertha rebelled against the punishment, and then the child and mother would strike and "curse" each other. The mother had an obsession for cleanliness; she did not even permit Bertha to play on the street lest she become dirty. To such a parent soiling was particularly annoying. Soon after her marriage and long before Bertha was born, the mother had lost both parents and a brother and sister in a fire in a tenement house. Bertha had often heard of this tragedy, and it is therefore not surprising that the girl had a fear of fire, perhaps partly caused by an unconscious wish that her mother should similarly meet death.

The mother had only one friend, a neighbor, and by keeping Bertha in the house she gave the child practically no opportunity to have companions of her own. The mother permitted none of the children to bring friends into the home, because she feared something might be broken. The siblings were considerably older than Bertha; there were 2 brothers, who were 14 and 17 years of age and a sister 19 years old who was said to have a mental age of 8 years. The mother had a fear that this older girl would be seduced if she ever spoke to a boy, and to prevent this she placed her in an institution for mentally defective persons for about a year. She was now home again for a few months. The mother often tried to compel obedience and cleanliness from Bertha by frightening her with threats of placing her too in an institution. Encopresis was precipitated by starting school, and this event must have been equivalent in the child's mind both to placement in an institution and to desertion by the mother. The child's anxiety over such a desertion was also demonstrated in the clinic by extreme panic when it was suggested that the mother leave the room so that the child could be interviewed alone. For months after this incident the child would utter hardly a word in my presence, though she was talkative elsewhere. The persistent refusal to talk was due to transference [3] and was a repetition, with displacement to another field, of her refusal to have stools at her mother's command. Her action exemplified the situation described by Bergler [4] in which "thoughts are made the equivalent of feces and withheld." During the period of silence she showed a friendly attitude and a desire to impress me by having her father bring her excellent reports from school to the clinic.

Her obstipation expressed her rebellion, while the incontinence expressed the conflict between her urge to comply with the mother's demands and her aggressive resentment of the mother's acts and attitudes. Bertha's resistance to her mother's command that she have stools persisted even after the passage of feces. The child still attempted to retain the stool by holding it between the buttocks, thereby producing perianal dermatitis. Another factor was Bertha's extremely intense desire for a baby, which she manifested in play fantasies and by mothering three neighbors' infants. According to Freud [5] infants and feces are equated in the unconscious mind and the small child commonly infers that birth occurs by ways of the anus. Therefore, one may assume that, although Bertha's obstipation was originally a reaction of revolt, it was later partly sustained by the unconscious thought "I will make a baby by holding my stools till I have a big belly like Mrs. A's, Mrs. B's and Mrs. C's just before they had babies." When given this interpretation, the child replied that whenever she received enemas for an attack of obstipation her sister remarked that Bertha was having a baby. Bertha also stated that an infant is born covered with "food." It was never possible to assay how great a role anal erotism played in this child. It was apparent, however, that Bertha's symptoms were due chiefly to unconscious revolt.

Although Bertha was clean and free from obstipation after her first visit, with voluntary movements of the bowels about twice a week, there were a number of recurrences of dirtying. Such an attack occurred when Bertha was excluded from school for pediculosis capitis and the mother, to aid the cure of this condition, had Bertha's long hair cut twice to a boyish length. By coincidence the girl was summoned to the follow-up clinic at the same time, and she feared that she would be hospitalized again, particularly since the mother was once more threatening placement of the child in an institution. On one occasion Bertha apparently had encopresis without obstipation, just as the other children in this series did. The attack lasted exactly the two weeks that the mother was in the hospital for an operation. The mother's absence from home probably aroused in the child both anxiety over the seeming loss of this parent and feelings of guilt, which were caused by the apparent fulfilment of death wishes that she directed at her mother.

Therapy was handicapped by the frequent failure of the mother to keep appointments when the soiling ceased and by the obstinate silence of the child. For months treatment was usually limited to observing the child's actions, conversing with the parents in the child's presence and giving the parents and the child interpretations. It was necessary to prove to both mother and child that along with the hate that each bore the other there existed a considerable admixture of unconscious love. It was extremely difficult to modify the mother's

3. Freud, S.: Further Recommendations on the Technique of Psycho-Analysis: Recollection, Repetition and Working Through, in Collected Papers, ed. 3, published by L. Woolf and V. Woolf, London, Hogarth Press, 1942, vol. 2, pp. 366-376.

4. Bergler, E.: On the Resistance Situation: The Patient Is Silent, Psychoanalyt. Rev. **25**:170-18 (April) 1938.

5. Freud, S.: On the Sexual Theories of Children, in Collected Papers, ed. 3, published by L. Woolf and V. Woolf, London, Hogarth Press, 1942, vol. 2, pp. 69-71; On the Transformation of Instincts with Special Reference to Anal Erotism, ibid., pp. 164-171.

jecting attitude, and it is yet uncertain whether a rmanent cure of this child was attained. However, ychotherapy produced worth while improvement.

CASE 3.—Bobby, an only child 6½ years of age, was ought to the clinic by his grandmother because he th wet and soiled his clothes and was restless and ervous." Nocturnal enuresis occurred only occasion-ly. The enuresis may have been of longer duration, t the encopresis had begun two years previously, out the time the child's parents separated. According the grandmother the father drank and struck the other. Bobby remembered nothing of this, not even at he had ever lived in a home with both his parents that he had slept in a crib in their room until the paration occurred. Now he was spending five days week with his grandmother. Every week-end Bobby ent with his mother, sharing her bed; the rest of e week she was working. Bobby had seen his father nce a week until the latter went into military service. t Christmas time, while helping to pack cookies for e absent father, Bobby felt sad and cried. In fact, obby cried frequently, and at times he said he wished e would die. However, he was unhappy chiefly because e could not live with his mother seven days a week. lthough Bobby at first claimed that both his parents ved him, he later said he was not sure of even his other's love because she did not have him with her l the time. Once he said he was a "traitor," and hen he was questioned he referred the self condem-ation to his playmates. However, I related the feeling guilt to his attitude toward his father; Bobby had is mother to himself, even though only for two days week, not sharing her now with the father. Bobby ad a fear of the dark. He dreaded injury, and also, nce he had witnessed the sudden, unexpected loss of n uncle about six months previously, he dreaded death. he fear of death may have been based on a death ish directed at his rival, the father. Such aggressive antasies were disclosed when he stated that he had eceived a postal card from his father but that the andwriting was unnatural and that therefore the father ad injured his finger or perhaps had cut off his finger. The grandmother, with whom Bobby spent most of is time, worried that she might "spoil" him. She tried o force him to eat, even fed him, and sent him to bed or not eating. She tried to prevent him from being baby and nagged him frequently to go to the toilet. he continually tried to stop him from putting his fingers nto his mouth and urged him to talk less rapidly. She ttempted to establish a routine for him, punctual to he minute, and when she was unsuccessful in these fforts she spanked him.

Nothing could be done about Bobby's broken home; nd since only the grandmother could be interviewed t was possible to influence only her attitude toward the hild. However, Bobby was made to realize some of his unconscious feelings, and he volunteered that I was he only physician he had seen whom he could under-stand. After his fourth visit Bobby ceased wetting and soiling himself although he was discontented and un-happy because of his broken home. Frequently, while playing, Bobby tied toys and other objects together, an act that was interpreted as symbolizing his desire for more binding family ties.

CASE 4.—Ada, 6 years of age and next to the youngest of 6 children, had been soiling her under-wear almost continuously since birth, but only by day. There was never any enuresis. The child received little maternal care during her first year because of ill-nesses of her mother and other members of the family. As a result she was cared for by neighbors and various relatives and never learned to speak Italian, her mother's language. With training, cleanliness was achieved when she was 3 years old, but after the birth of a sister, Betty, one month later, Ada relapsed and soiled herself continuously until she came under my care. Ada felt that Betty received the major share of attention and love from the parents, other members of the family and visitors. The 2 children quarreled over their posses-sions, of which also Ada felt she never received a fair share. Ada frequently struck Betty as well as her other playmates. Many times Ada had complained, "Nobody in this family likes me," She would often cry without any reason apparent to the family. There were one or two neighbors who had been motherly to her, and her sister Philomena, aged 13 years, had acted in a maternal manner. However, like many misguided mothers, Philomena tried to compel obedience from Ada by frightening her with ghosts, shadows and the dark. Ada had enjoyed kindergarten but not her present school work, although she liked the teacher. School was the only place where she never soiled herself.

During the first few visits the foregoing facts were ascertained, and Ada was made conscious of her re-actions to them. Then for the first time I saw and spoke to the mother. The latter was obviously aggres-sive and antagonistic. She demanded strict military discipline from the child, and she had punished her with blows and by putting her in a cellar and had frightened her with the threat of a "deeper cellar." She felt that the neighbors spoiled her children. On being questioned the mother denied that she loved Betty more than Ada, but in the mother's presence Ada in-sisted that this was so. After the mother became conscious that she was acting like a dictator in her home and after she acquired a better understanding of Ada, her attitude toward the child changed radically for the better. The latter at once stopped soiling (after six visits to the clinic), showed a friendly attitude to-ward Betty, ceased to fear shadows and ghosts and, as a token of reconciliation, began to speak Italian to the parents. As a result both Ada and her mother were much happier.

Although the improvement in the relations between Ada and her family was permanent, after three months she again began to dirty her underwear with feces. The onset of the relapse was abrupt, and by questioning Ada it was discovered that the recurrence of soiling followed immediately after she had chanced to witness her parents in coitus. She denied any previous similar experience, but this was probably an untrue statement, the result of repression. Although it may be assumed that Ada originally had the "sadistic conception of intercourse" typical of early childhood,[5] she now correctly interpreted what she heard and saw not as an act of violence but as an act of love. However, she was jealous because, to her, the act indicated that both her parents loved each other more than they loved her. Ada would have liked to replace her mother in this act with the father; but she would have preferred even more to take her father's role with the mother, and she assumed the father's position, on her knees, whenever speaking of the incident. She also revealed that she had attempted to duplicate the parents' act with Betty. She denied that she had passed feces while observing the intercourse of her parents, though it is possible that she may unconsciously have felt that her father was defecating during the act. Ada was made fully conscious of the interpretation of her re-action, but there was only slight improvement of the soiling.

Finally, however, it was discovered that the dirtying was due to anxiety generated by a phobia. The family reported that Ada passed feces only when she heard an air raid siren or a fire engine. The two stimuli which excited anxiety were associated because fire engines are equipped with sirens, which, however, are unused since the installation of air raid sirens to avoid confusion. At a fire, according to Ada, everything either consumed by the flames or damaged by the firemen's efforts is destroyed by the fire engine. On her third visit Ada recalled an old dream dating back one or two years. In this dream she was on a porch and watched a fire engine drive along the street. One may suspect that the porch was the crib with sides like a porch railing that she had occupied in her parents' bedroom until she was 3 years of age and that the fire engine driving along the street symbolized in her dream her parents' coitus, which she already had witnessed from her crib before she reached the age of 3. Apparently this dream had supplied the chief object of anxiety employed later in her phobia. Therefore, because of the obvious symbolism and because the relapse started immediately after Ada observed her parents in intercourse, the interpretation was given that the siren equaled the mother in coitus because of similarity in the sounds emitted, while the fire engine was the father in coitus. Immediately after this interpretation was made all soiling ceased, ending a relapse that had lasted over three months, during which period the mother could be persuaded to bring Ada to the clinic only six times. Since then (ten months) Ada has always been clean and is no longer "scared" by the air raid siren or by the fire engines. At a later visit the child drew a fire engine with two people on it; so a final interpretation was given that the fire engine was the two parents joined in coitus, and Ada accepted this meaning with a smile.

TERMINOLOGY

The term encopresis was first coined in 1926 by Weissenberg,[6] who regarded the disorder as analogous to enuresis. Schilling[7] in 1891 used the term defecatio involuntaria juvenilis. Before Weissenberg introduced the term encopresis, the condition was included under incontinentia alvi. Now, however, the last-mentioned term is usually reserved for fecal incontinence caused by injury to or disease of the anal sphincter, the rectum or the nervous system, including the nerves of the anal region, or by stupor or coma, including epileptic convulsions, or general debility. Obstipatio paradoxa, a term employed by Jekelius,[8] designates encopresis with severe obstipation, which results in enlargement of the abdomen with palpable fecal masses, overdistention of the rectum with hard feces and usually perianal dermatitis. The term paradoxa refers to the simultaneous existence of both obstipation and incontinence.

6. Weissenberg, S.: "Enkopresis," Ztschr. f. Kinderh. **40**:674-677, 1926.

7. Schilling: Unwillkürliche Stuhlentleerung der Jugend, Deutsche Med.-Ztg. **12**:691, 1891.

8. Jekelius, E.: Incontinentia alvi im Kindesalter, Arch. f. Kinderh. **109**:129-138, 1936.

CAUSATION

Some authors[9] have published reports encopresis in children without giving thou to psychic factors. Ostheimer[10] in 1905 show his lack of insight when he wrote, "The cases which some antecedent illness is known to h been the cause are easily understood; but those children in whom incontinence of fe alone or incontinence both of feces and of ur occurred, the anal sphincter must have b affected, even though digital examination fai to elicit any relaxation of this muscle." In so cases reported by other authors[11] psychic fact were so glaring that they were mentioned bri and even remedied, but the improvement or c obtained was attributed to some drug, diet regimen that had also been prescribed. Ma fan[12] reported on 10 schoolboys with encopres of whom 6 had a positive Wassermann reacti He therefore suggested that one should sear for signs of congenital syphilis in such patie and that even if none were found one should tempt antisyphilitic therapy. However, Glanzmann[13] pointed out, there can be no rect relation between syphilis and encopres The coincidence may perhaps be explained the greater frequency of syphilis in parents neglected children living in bad environmen As Jekelius[8] stated, every attack is functiona determined and curable in principle. Burns also stated that encopresis is primarily a psych genic disorder. Similar views have be expressed by Shirley,[15] Glanzmann,[13] Kanne

9. (*a*) Rivière, A.: Incontinence fécale par regorg ment chez une fillette de douze ans, Med. mod. **9**:30 309, 1898. (*b*) Hungerland, H.: Chronische Obstip tion als Ursache für Incontinentia alvi, Arch. Kinderh. **108**:43, 1936. (*c*) Fucci, C.: Un caso defecazione involontaria, detta degli scolari, Prat. pedi **13**:179-183 (March) 1935. (*d*) Wallace, A.: I continence of Feces, St. Barth. Hosp. Rep. **24**:2 1888. (*e*) Priesel, R., and Siegl, J.: Chronisc Obstipation als Ursache für Incontinentia alvi, Arc f. Kinderh. **107**:133-136, 1936.

10. Ostheimer, M.: Incontinence of Feces in Ch dren, Univ. Pennsylvania M. Bull. **17**:405-407 (Fe 1905.

11. (*a*) Griffith, J. P. C.: Nervous Incontinence Feces, Arch. Pediat. **16**:416, 1899. (*b*) Hartsilver, Incontinence of Faeces in a Young Girl, Lancet **2**:42 428 (Aug. 24) 1935. (*c*) Oegg, H.: Ein Beitrag z Beurteilung und Behandlung des Krankheitsbildes d Incontinentia alvi im Kindesalter, Monatschr. f. Kinder **79**:230-235, 1939.

12. Marfan, A. B.: La défécation involontaire d écoliers, Presse méd. **42**:1-2 (Jan. 3) 1934.

13. Glanzmann, E.: Zur Psychopathologie der Enk presis, Ztschr. f. Kinderpsychiat. **1**:69-76 (Aug.) 193

14. Burns, C.: Encopresis in Children, Brit. M. **2**:767-769 (Nov. 29) 1941.

15. Shirley, H. F.: Encopresis in Children, Pediat. **12**:367-380 (March) 1938.

achter,[16] Thom,[17] Pearson [18] and Morichau-uchant.[19] Certainly any one who carefully lies children with encopresis, works out the chogenesis of each case and observes the ponse to psychotherapy must conclude that disorder is of psychic origin.

Pearson [18a] stated: "In many cases of soiling re is definite evidence of lack of parental love the child." Encopresis may occur if the d feels unloved, even by only one of its par-s, particularly the mother. Unfortunately he parents are not capable of loving a child oleheartedly. They unconsciously betray this , which is easily sensed by the child. Lack of ental love was present to various degrees in 4 of the cases reported here, and it is a ic factor in a variety of situations in which copresis occurs. Incontinence was precipi-ed in 2 of the 4 cases by the birth of a younger ling who became the recipient of the largest re of the parents' attention. Similar sibling lously occurred in a case reported by Shirley,[15] l the same situation was mentioned by nichel [20] and by Pearson.[18a] One of my 4 pa-nts attempted to regain the parents' attention ough the mechanism of an unconscious fan-y that she was again an infant and therefore led herself.

Parental love is surely lacking when a child s never had a real home with loving parents l when a child has a good home and then loses Schachter [16] stated that encopresis occurs fre-ently in asylums for illegitimate children and phans. Pearson [18a] stated. "It is a common perience for foster mothers to find that a well-ined young child loses all his training when ced in the new home, only to become clean ain when he starts to be fond of the new ther." According to Anna Freud,[21] when by separation a child loses its relation to the mother or nurse who is responsible for the establishment of cleanliness, it also loses the pleasure in fulfilling the requirement. The breaking up of a family precipitated encopresis in 1 of the patients described here, and in only 23 per cent of the cases reported by Jekelius [8] was the family intact. Burns [14] stated that in Britain during the present war encopresis is fairly prominent among the problems that result from the transfer of children from cities in danger of bombing to the safety of rural foster homes.

Shirley [15] stated that it is an outstanding fact that many children with encopresis are from unhappy homes, in which parental love is frequently lacking. This may be true of stepchildren and of children with alcoholic, highly neurotic or psychotic parents. Sometimes the unhappiness is due to extreme attitudes and ideas of the parents. The mothers of at least 2 of my patients were extremely domineering and despotically demanded strict discipline. They were feminine dictators who expected their children to respond with the alacrity of soldiers. Such mothers may constantly nag a child, directing every minute detail in his life, not realizing that they are destroying the capacity of the child for independent action and initiative. The mother usually does this because of anxiety, perfectionism or a desire to relive her life vicariously in the child's life or just for her convenience; however, she usually rationalizes her actions with the excuse that she does not wish to "spoil" the child. The father in such instances is usually weaker than average. Another extreme attitude, reported by Fowler,[22] Rotch,[23] and Schachter,[16] may be assumed by a father who has his own pedagogic ideas. He institutes an educational regimen that is calculated to develop an infant prodigy. For example, Fowler [22] reported on a 7 year old boy whose father was extremely ambitious in regard to the son. Education was started when the boy was 4 years of age, and the pressure was gradually increased. When he was 7 years old, the boy's studies began before breakfast and included Spanish, German, French and music in addition to the ordinary curriculum. Fowler stated that "under such conditions it is not to be wondered at that something gave way, and fortunately for the brain, it was the sphincter ani."

Marfan [12] designated this disorder "involuntary defecation in school children." In 2 cases reported by Shirley [15] encopresis began when the

16. Schachter, M.: L'énurésie et l'encoprose diurne sécoliers, Semaine d. hôp. de Paris **10**:254-258 (April 1934.

17. Thom, D. A.: Everyday Problems of the Every-Child, New York, D. Appleton-Century Company, ., 1934.

18. (*a*) Pearson, G. H. J.: The Psychiatry of Child-od, in Christian, H. A., and Mackenzie, J.: Oxford edicine, New York, Oxford University Press, 1936, . 7, pp. 172-173. (*b*) English, O. S., and Pearson, H. J.: Common Neuroses of Children and Adults, w York, W. W. Norton & Company, Inc., 1937, . 27-35 and 112-117.

19. Morichau-Beauchant, R.: False Incontinence in ildren, Paris méd. **12**:83-89 (July 22) 1922.

20. Fenichel, O.: Outline of Clinical Psychoanalysis, w York, W. W. Norton & Co., Inc., 1934, pp. 25-26.

21. Freud, A.: Introduction to the Technic of Child alysis, Nervous and Mental Disease Monograph 48, ashington, D. C., Nervous and Mental Disease Pub-hing Company, 1928, p. 46. Freud, A., and Burling-m, D. T.: War and Children, New York, Medical ar Books, 1943, pp. 73-76 and 160.

22. Fowler, G. B.: Incontinence of Feces in Children, Am. J. Obst. **15**:984-988 (Oct.) 1882.

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children started school and was present only when they were in school. Glanzmann [13] mentioned a child who had difficulty with arithmetic and had incontinence of feces only in school. Schachter [16] stated that encopresis may be a reaction against scholastic authority. Shirley [15] had 1 case in which the symptom occurred in a child at boarding school and ceased when the child returned home. He also noted that 18 of 25 children of school age with this disorder had difficulties at school. There were other important causative factors in 1 of the cases reported here, but encopresis was precipitated by starting school, an event which seemed to the child to be desertion by the mother.

In cases reported by Shirley,[15] and Kanner [1] and in 2 of the cases reported here, the mother was excessively preoccupied with the child's intestinal functions. From the child's early infancy the mother had constantly employed cathartics and enemas, because of her anxiety concerning possible harm from lack of frequent intestinal evacuations. Training in habits of defecation may be started too early or may be too insistent. The mother of 1 of my patients placed the infant on a pot every half hour, not only at home but even in the street.

Usually after the onset of encopresis the mother continuously nags the child, forcing him to go to the toilet many times a day. This only increases the pressure on the child and tends to perpetuate the incontinence. Also it usually proves ineffective, as the child may soil himself immediately after leaving the bathroom. In 1 case constant nagging by a domineering and rejecting mother resulted in a reaction of revolt. The child unconsciously refused to defecate as the mother ordered and tried tenaciously to retain the feces, which resulted in the syndrome termed by Jekelius [8] obstipatio paradoxa. With this syndrome the abdomen may be much distended, and fecal masses may be palpable. However, the child cannot retain his feces indefinitely, and soon there is incontinence with the loss of a small pieces of fecal material at a time. Even then the child still probably seeks to retain its feces, holding the pieces in the anal fold, between the buttocks, thereby producing the macerated perianal skin apparently found only with incontinence of this type. Cases of obstipatio paradoxa have been reported by a number of authors. Priesel and Siegl [9e] and others claim that regular emptying of the intestinal tract of such patients with enemas and cathartics effects a cure. Treatment of encopresis of this type should perhaps be initiated by such measures, but one should never omit psychotherapy.

In the unconscious mind, according to Freud,[5] feces are equated principally with gift, infant and penis. Alexander [24] utilized the gift significa of feces to explain severe constipation. general formulation may appropriately be ap specifically in the case of obstipatio para reported here. The child's subconscious "rea ing" was as follows. "Inasmuch as I do receive love from my mama, I do not need give her my stool." In such instances the f is regarded by the child as a valuable possess perhaps even as a part of himself.[18] Such a to the mother would be a token of the ch love, which in the case referred to was like withheld. At the same time a negative attit toward the intestinal contents and toward mother may be expressed by encopresis. A ander reconstructs the attitudes as "Well, i have to give, by all means you may have but nothing better than excrement." In expre ing the attitude of my patient with obstip paradoxa one may add, "and since my mam so obsessed by cleanliness, let the stool go i my clean panties." The apparent contradict in the child's attitude toward his feces, nam that they are regarded at the same time as p cious and valueless, merely reflects the pare attitude toward defecation. Children are c gratulated for adequate and satisfactory defe tion at the right time but are scolded and trea with disgust when they soil themselves.

In the case of encopresis with obstipation scribed in this report, although the tenaci retention of feces was originally a reaction revolt against a domineering and rejecti mother, it was later partly maintained by additional factor, the girl's intense desire a baby to mother. By holding her stools was unconsciously striving to attain the grea enlarged abdomen that had been evident to in various neighbors before they had babies. this case obstipation was the result of the eq tion of infant and feces in the unconscious m and of the theory common with children t birth occurs through the anus.

According to the literature another cause obstipatio paradoxa is anal erotism. Freud mentioned "children who like retaining th excreta till they can derive a voluptuous s sation from their evacuation." An adult analy

24. Alexander, F.: The Influence of Psycholo Factors upon Gastro-Intestinal Disturbances, Psyc analyt. Quart. **3**:529-539 (Oct.) 1934.

25. Freud, S.: A Phobia in a Five-Year Old Boy, Collected Papers, ed. 2, published by L. Woolf and Woolf, London, Hogarth Press, 1942, vol. 3, p. 2 Infantile Sexuality: Three Contributions to the Theo of Sex, in The Basic Writings of Sigmund Fre translated by A. A. Brill, New York, Modern Libra 1938, pp. 589-590.

Stekel [26] reported that as a boy he was stomed to hold back his stools a long time. n he played with them by propulsion and pulsion through the anal sphincter, thereby ining a feeling of pleasure. While doing this ften soiled himself, for which he received oral punishment. Glanzmann [13] reported on rl of 9 years with an almost identical history. richau-Beauchant [19] recorded 3 cases in which conditions were believed to be similar. This vior is regarded as a substitute for masturon. However, one may infer that in such s the stool is equated with the penis. ichel [20] says that frequent incontinence of s is possible only if the person is highly anal ic.

nxiety can produce diarrhea and may be an ortant factor in fecal incontinence. Anxiety certainly result from lack of parental love, ng other things. In one of Shirley's [15] cases luntary defecation was caused by the boy's of injury by his father. Burns,[14] referring ncopresis precipitated by present war conons, said that the disorder is "a protest inst an inimical and threatening environnt." Jekelius [8] classified 40 per cent of his ients as "Angstkinder." He stated that they e shy, anxious, ashamed of their incontinence afraid of the dark and of dogs and that 15 0 children in this group had a fear of going he toilet alone.

bnormal fears favor retention or incontinence eces. For example encopresis may be caused ctly by toilet phobia. One child reported on Kanner [1] sought to avoid using the toilet bese he feared being washed down the drain e as the feces were. The fear of the loss of s because this seems to the child to be a loss a part of its body may become a phobia.[18a] copresis may be produced less directly by iety generated by phobias unrelated to defation. In 1 case reported here a phobia ulted from witnessing the parents in coitus. eud [27] reported a phobia (with encopresis) ed on such an incident and Fenichel [20] rded this experience as a common cause of bias in children. To avert such psychic trauno child should sleep in the parents' bedm.[28] According to Melanie Klein,[29] even a baby that seems to be asleep may perceive the parents' intercourse in a dim way, so that a vivid but distorted memory of the experience remains in its unconscious mind and has harmful effects on the infant's future development. A child is practically sharing its parents' bedroom when it sleeps in an adjoining room with an open door or a glass-paneled door between. Unfortunately such sleeping arrangements are extremely common, because of economic conditions or parental anxiety. Even if the child has its own room, opportunity for such psychic trauma may occur on trips or during an illness of the child, when it may temporarily share the parents' bedroom.

Encopresis has been described as a spite reaction. A boy described by Pototzky [30] always soiled himself two hours after a scolding (never right away) and "felt triumphant" over the parents' rage. As a rule, however, such a spite reaction is unconscious, and it is a mistake to regard the act as voluntary misconduct which deserves punishment. Punishment usually serves only to aggravate the disorder. Stier [31] perhaps overemphasized the role of sadism in encopresis. However, as has been pointed out by Melanie Klein,[32] a small child may in fantasy employ his excreta for aggressive and sadistic purposes including revenge. Jekelius [8] classified 20 per cent of his patients as "Bösheits- oder Aggressionskinder." He stated that they opposed home or school, that they were against their parents, siblings and playmates, that they destroyed or threw everything and tore their own clothes and that they defecated in their underwear or bed, often right after being put on the toilet, as if for spite. He also stated that children of this aggressive type are prone to have obstipatio paradoxa. Kanner [1] says it is especially interesting to note the frequent occurrence of temper tantrums in connection with encopresis.

However, children with encopresis exhibit not only sadistic but strong masochistic trends. Unconsciously they bring on themselves all sorts of scolding and punishment; they are treated

6. Stekel, W.: Störungen des Trieb- und Affektles, in Psychosexueller Infantilismus, Berlin, Urban Schwarzenberg, 1922, vol. 5, p. 218.

7. Freud, S.: An Infantile Neurosis, in Collected pers, ed. 2, published by L. Woolf and V. Woolf, Lon-, Hogarth Press, 1942, vol. 3, pp. 552-563.

8. Sharpe, E. F.: Planning for Stability, in Rickn, J.: On the Bringing Up of Children, London, gan Paul, Trench, Trubner & Co., Ltd., 1936, pp. 14-

Spock, B., and Huschka, M.: The Psychological pects of Pediatric Practice, in Blumer, G.: Practioners Library of Medicine and Surgery, New York, D. Appleton-Century Company, Inc., 1938, vol. 13, pp. 795-797.

29. Klein, M.; Weaning, in Rickman, J.: On the Bringing Up of Children, London, Kegan Paul, Trench, Trubner & Co., Ltd., 1936, p. 52.

30. Pototzky, C.: Psychogenese und Psychotherapie von Organsymptomen beim Kinde, in Schwarz, O.: Psychogenese und Psychotherapie körperlicher Symptome, Berlin, Julius Springer, 1925, p. 417.

31. Stier, E.: Soiling in Children and Its Relation to Wetting, Ztschr. f. Kinderforsch. **30**:125-144 (March 28) 1925.

32. Klein, M.: The Psycho-Analysis of Children, translated by A. Strachey, published by L. Woolf and V. Woolf and Institute of Psycho-Analysis, London, 1932, pp. 205, 230 and 281.

with contempt and disgust, and they subject themselves to social ignominy in the family, among their playmates and at school. Nothing deters them, and they continue to "take it," thereby giving definite evidence of masochistic tendencies.

Another psychic mechanism involved in encopresis is regression, which is typified by the reaction of the patient who had a definite unconscious fantasy of being an infant again. Excessive "babying" of a child, such as may occur during a severe illness, may encourage regression. Gurewitsch [33] reported an extreme instance of regression. A 36 year old man was brought to the clinic like a bad boy by his obviously domineering wife. Until he was 14 years of age he had had incontinentia alvi and urinae in spite of blows and reproaches by his mother. The symptoms had now recurred to such an extent that the wife finally put diapers on him at night. Gurewitsch interpreted this as a regression to the status of a small child.

Involuntary defecation is of course normal in early infancy. According to Susan Isaacs [34] control of the bowels is commonly achieved at about 18 months, though some children will be clean earlier and many perfectly normal, happy children achieve control a good deal later than this. In the period right after the infant's training in control of defecation, when control of the bowels seems achieved, encopresis is common. According to Isaacs [34] "occasional breakdowns will occur with every child." She stated that "sometimes no external reason can be traced. In other cases, it is clear that a particular happening has stirred up the difficulty, for example, a change in general routine, a change from the bottle to solid food, a change in the time of the midday rest, going away for a holiday, teething, the birth of another baby, the mother's illness or miscarriage, the loss of a nurse and coming of a new one, and other such significant events." Likewise Menninger [35] stated that "most infants go through the experience toward the end of their anal phase of development of having occasional 'accidents' of soiling." He described a "phase of defiance" during which the infant refuses to perform on the toilet but performs at an inappropriate time, after the parent has g up. This phase of defiance may lead to a "p of sensual pleasure in retention." Kubie [36] st the belief that sullen refusal, retention and w soiling at the time of the shift from the wea of diapers to the use of the toilet may result cause the child has been deprived of the "c fort of the cleansing rituals spread over genitals."

Kanner [1] stated, "Persistence of soiling yond the end of the second year of life ma due to serious mental retardation, or to lac proper training or both." Only if a child never been clean may a lack of training be pected; the lack of training, however, ma fundamentally a result of neglect and lack parental love. Seven of Shirley's [15] 33 pati with normal intelligence had a history of soi since infancy. Jekelius [8] stated that 81 per of his patients were never clean, a surprisin high figure, particularly since only 16 per of the children were idiots and imbeciles. Th of the 4 patients described in this report had b clean for years before the onset of encopre The fourth, a neglected child, first achie cleanliness in her third year, but one month la coincident with the birth of another sibli she reverted to soiling which continued another three years, until it was cured psychotherapy.

Encopresis is more frequent in feebleminde than in normal children. Of 70 patients scribed by Shirley [15] 21 were idiots or imbeci 5 were morons and 10 were of borderline int ligence. However, of all feebleminded childr seen by Shirley at the Psychiatric Clinic of t Harriet Lane Home for Invalid Children, o 4.8 per cent had encopresis, including only 14 p cent of the idiots and imbeciles. Kanne stated: "We have seen many idiotic and imbec children who with good training had establish good fecal and urinary habits at an early a and again others in whom the training had b but little effect. Usually, at about five years age, even the imbecile (and sometimes the idiot child had ceased to soil himself." The sa psychic factors may operate in mentally defecti as in normal children, but lack of training resu ing from parental defeatism, neglect and lack love is probably of great importance in the caus tion of encopresis in feebleminded children. Th assumption is supported by the fact that a d has enough intelligence to be taught cleanlines Incidentally, the author knows of a dog with w established habits of cleanliness that reverted soiling when psychically disturbed by not bei

33. Gurewitsch, W.: Beitrag zum Problem der Organneurose: Hysterische Harnverhaltung und Stuhlinkontinenz, Deutsche Ztschr. f. Nervenh. **124**:247-257, 1932.

34. Isaacs, S.: Habit, in Rickman, J.: On the Bringing Up of Children, London, Kegan Paul, Trench, Trubner & Co., Ltd., 1936, pp. 133, 135, 147, 160 and 165.

35. Menninger, W. C.: Characterologic and Symptomatic Expressions Related to the Anal Phase of Psychosexual Development, Psychoanalyt. Quart. **12**:161-193 (April) 1943.

36. Kubie, L. S.: The Fantasy of Dirt, Psychoanal Quart. **6**:388-425 (Oct.) 1937.

mitted to sleep, as it was accustomed to do, he same room with its master.

TREATMENT

hysicians who ignored the psychic basis of opresis have employed a variety of drugs, uding ergot,[22] belladonna,[22] atropine, strych-,[22] antisyphilitic remedies,[12] vitamin B_1,[11c] calcium,[11c] and local treatment with oint-nts[8] and suppositories.[22] Some have em-ed faradic stimulation[7] or "remedial exer-s" of the abdominal and pelvic muscles, in-ding the sphincter ani. All such pharmaco-ic and physical therapy is superfluous and non-cific; it works, if at all, by suggestion, by nsference or if unpleasant by coercion, without olving psychic conflicts and without improv-the child's mental health.

The therapeutic approach described here is ed on psychoanalytic insight and methods, e these have in practice been most productive asting results.

First the physician must establish a good rela-nship not only with his small patient but with parents. Usually the mother brings the child he physician, and she should be permitted to her story in her own way, usually in the d's presence, with occasional encouragement go into greater detail when she reaches some nt of psychologic importance. At the end of story a question or two will again start her on angle that she may have omitted. This roach gains the cooperation and confidence parents and encourages them to become con-ous of psychologic factors. From this inter-w one may infer much about the attitudes d character of the parent. The actions of the ld during this recital and the reactions of the ent to the child must not be overlooked.

Then the child is encouraged to talk. Perhaps ring the parent's recital the child has already ntaneously added details to the story or at-pted to modify the account. In any event, the xt step is to gain the confidence of the child, to ke him feel that the physician is really a end and not a person who will lose his temper d scold or punish as the parents or teacher y do. One must have patience and devote a eat deal of time to the child. The employment toys and a "play technic" may be helpful. ter the initial timidity and anxiety have been ercome, the visits are with the child alone. though an occasional question may expedite ogress, usually the child should be allowed say whatever comes to his mind. One should ten attentively to apparently trivial details, as y may have more significance than is at first parent. In time the child will confide what he remembers of past experiences, including the emotional reactions, and interpersonal relationships at home, with playmates and at school. However, a child does not realize his unconscious attitudes and therefore cannot directly tell one about them. Nevertheless, with the aid of experience, conclusions concerning these attitudes may be drawn after observing what a child says and does, how he chooses to play and what dreams and fantasies he constructs.

The final step in psychotherapy is gradually to interpret the unconscious attitudes to the child so that he is fully conscious of the reasons for his actions. This step permanently removes many of the child's psychic strains and conflicts. In the treatment of small children it is frequently necessary to relieve excessive environmental pressures, particularly those placed on the child by the parents. This is accomplished by tactfully interpreting to the parents their unconscious attitudes so far as these affect the child and by promoting in them greater comprehension of the child. However, I treated 1 patient with encopresis, precipitated by the breaking up of the family, successfully without ever seeing either parent, without affecting their attitude toward the child and without changing the status within the family. In the treatment of this disorder one must usually influence the parents to employ an attitude of kindness and love instead of strict discipline and constant punishment.

Of course a child deserves praise when cleanliness is achieved, but any efforts to induce control by offering rewards or bribes or even using a "star chart" are of questionable utility. Such short cuts may at times appear to succeed, but they are apt to result in the substitution of other symptoms for soiling without effecting any permanent improvement in the child's mental health. The proper procedure is to relieve the unconscious psychic strains and conflicts; then the child will become clean. To be more condemned, but for similar reasons, is the method of Jekelius,[8] who, despite adequate insight into the psychic origin of encopresis, sought to coerce cleanliness by administering ill tasting drops, decreasing the number as the child improved and increasing it after a relapse. He claimed success in 60 per cent of his cases from the use of this routine alone. Aside from the element of suggestion, this method is merely punishment in a subtle form. Almost always the parents have tried punishment before consulting a physician but have usually abandoned it as useless or aggravating. An unconscious act such as encopresis should not be regarded as intentional misbehavior meriting punishment.

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Obituaries

JOSEPH BRENNEMANN, M.D.

1872-1944

Dr. Joseph Brennemann died at his home near Reading, Vt., on July 2, 1944. Although he had retired from full time work a year previously, he had not given up his interest in pediatrics. He continued to spend much time editing his "Practice of Pediatrics," and carried on an extensive correspondence with many medical colleagues. During the month of April 1944 he served as visiting physician at the Milwaukee Children's Hospital. In June he read a paper before the Section on Pediatrics of the American Medical Association.

Dr. Brennemann was born near Peru, Ill., on Sept. 25, 1872. His premedical education was obtained at the University of Michigan, and his medical degree was received from Northwestern University Medical School in 1900. He served a two year internship at St. Luke's Hospital, Chicago, and then engaged in general practice on Chicago's south side. After a few years he decided to specialize in pediatrics, and in 1910 he spent several months in European pediatric clinics. For many years he was attending physician in the pediatric outpatient department of Northwestern University Medical School, was actively engaged in teaching medical students and was in addition attending pediatrician at St. Luke's Hospital and at Wesley Memorial Hospital. In 1921 he, gave up these appointments to become chief of staff of the Children's Memorial Hospital, where he remained for twenty years. After his retirement from the Children's Memorial Hospital he became chief of staff of the Children's Hospital, Los Angeles, and professor and head of the department of pediatrics of the University of Southern California Medical School.

Dr. Brennemann was the recipient of practically all of the honors which pediatrics could confer on him. He was a member of the Chicago Pediatric Society, the American Academy of Pediatrics and the American Pediatric Society. He was president of the American Pediatric Society in 1930. He was an honorary member of the Society for Pediatric Research and a corresponding member of the British Pediatric Society.

It is difficult to know what qualities make for greatness in the field of medicine. That Dr. Brennemann had certain qualities which set him apart from the majority of his colleagues all who knew him will agree. He had a rare independence of mind. The new in medicine had to be subjected to the severest scrutiny not once but many times before he was willing to accept it. He never followed the crowd. In fact, he sought on numerous occasions to turn his colleagues from accepting too easily the current fashions in pediatric thought. Brief reference to three particular articles will, I think, reveal his keen insight into medical trends.

In the period when "the mothers' eyes were fixed on the scales as the final arbiter of nutrition" Dr. Brennemann wrote "Psychologic Aspects of Nutrition in Childhood"; when physicians were becoming enthusiastic over new and well publicized topical applications he wrote "Vis Medicatrix Naturae in Pediatrics," and when both physician and laity began to talk glibly of conditioned reflexes, behavior problems and complexes he wrote "The Menace of Psychiatry." This last paper, certainly the most popular of all his medical articles, brought hundreds of congratulatory letters not only from this country but from all over the world.

In spite of the wide acclaim which followed these more or less philosophical articles, Dr. Brennemann always insisted that his paper, published in 1911, entitled "Contribution to Our Knowledge of the Etiology and Nature of Hard Curds in Infants' Stools" was his best piece of work. It settled a controversy that had engaged pediatricians over a number of years.

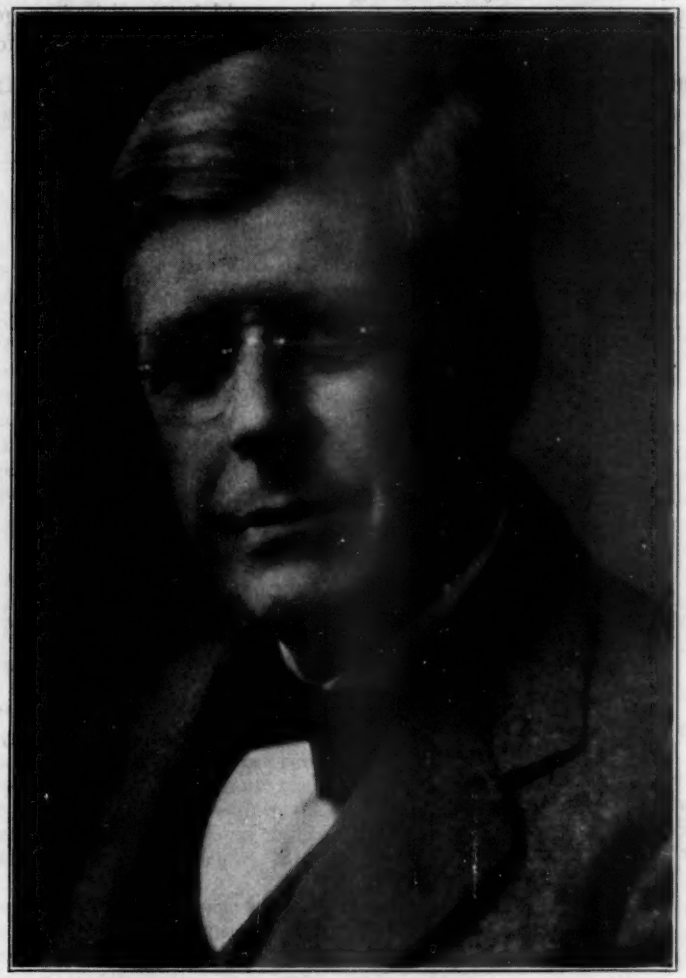
His supreme achievement, however, was his editorship of and his extensive contributions to "Brennemann's Practice of Pediatrics." He was a careful and painstaking editor, feeling personally responsible for the quality of all of the articles which were submitted. This monumental work has assured him an enduring place among the great leaders in pediatrics.

His fame as a teacher equaled or excelled that which he enjoyed as a writer. He spoke clearly in good voice, and was always accurate to the most minute detail in his presentations. He had a superb gift of showmanship. He knew how to set contrasting cases off against one another; he knew how to highlight the essential features which made the case worth while, and he knew the value of suspense in holding the interest of his audience.

In spite of his zeal and fierce concentration on clinical medicine, Dr. Brennemann still found time for excursions into fields far removed from his professional studies. He was an omnivorous reader. A good many years ago while spending some ten days in bed with an infection of the

per respiratory tract he read in its entirety a rly formidable textbook on geology. A year o I spent an evening with him as he was ssing through the city. I asked him whether had read a certain article in a recent maga- e. He said, "No, I do not believe I have me to it yet. I have the magazine with me in Spanish edition, and I am a bit slow in ding it. I don't know why the devil a man from his farm just a few days before his death he was complaining about the weather. He said: "It has rained all day; in fact, it has rained all week. I am beginning to feel as Noah must have felt, only he had an assurance from the Lord that is lacking in my case."

Over and above Dr. Brennemann's brilliant intellectual achievements was his solidity of character. One never doubted his sincerity. He



JOSEPH BRENNEMANN, M.D.
1872-1944

seventy should be trying to perfect his Spanish, t anyway it's good fun." Then with a twinkle his eye he quoted a Latin phrase—I had eard him quote it a number of times before— hich being translated means, "Nothing of man interest is foreign to me." What he had id half in jest was in real truth a perfect haracterization.

Dr. Brennemann's conversation, his writing and s teaching were enlivened by a gentle irony nd a fine sense of humor. In a letter written could not tolerate pretense or sham. He stood for what he believed to be right and had the courage to voice his convictions. He cared not at all for social life in the usual sense, but he was supremely happy in a small gathering of congenial friends. His friendship knew no bounds. He was no less the friend of the errand boy at the hospital or of the humblest dispensary patient than he was of his medical associates.

Yet it was the young men and women in medicine who were nearest to his heart. He

was never the "big professor." He worked *with* his residents and always insisted that he learned more from them than they from him. His attitude is exemplified in the dedication of his Practice of Pediatrics: "In a very affectionate sense to that keen, earnest and loyal group of young men and women whom I have tried to teach and who have taught me so much, my interns and residents of many years."

Dr. Brennemann married Bessie Darling Daniels in 1903. Mrs. Brennemann, their three daughters—Mary, Barbara and Deborah—and seven grandchildren survive him.

Dr. Brennemann's final illness was brief. had complained of slight pain in his chest an his left arm for a few days. About twelve h before his death the pain became so severe his physician was called. Administration morphine gave relief. An electrocardiogram taken. A few hours later his physician retur with the tracings. Dr. Brennemann had just on his glasses to look at them when he slum suddenly and was gone. Surely it was the he would have wished to go—a clinician to very last moment of his life.

STANLEY GIBSON, M.D.

Abstracts from Current Literature

ochemistry; Bacteriology, and Pathology

OR CONTROL OF THE THORACIC DUCT. DARIO CEVEDO, Am. J. Physiol. **139**:600 (Aug.) 1943.

is inferred from these and from earlier studies the lymph channels are contractile organs under ous control. This contractility is one of the factors h governs the flow of lymph.

NOURSE, Cleveland.

Metabolism; Infant Feeding; Milk and Other Foods

LD PEAS AS A SOURCE OF PROTEIN FOR GROWTH. ELLA WOODS, W. M. BEESON and DONALD W. BOLIN, Nutrition **26**:327 (Oct.) 1943.

aw and heat-treated Alaska field peas (Pisum sati-) were studied as the sole source of protein in diets growing rats. A deficiency of methionine was found e the principal growth-limiting factor in the pro- s of the raw peas. Baking and autoclaving the field decreased the growth-promoting properties of the ein but did not change the amount of food ingested. tine added to the autoclaved peas permitted a rate rowth comparable to that with raw peas. Appar- y the Alaska field pea is an excellent source of the no acids essential for growth, with the single ex- ion of methionine.

FREDEEN, Kansas City, Mo.

DIES OF THE AVERAGE AMERICAN DIET. VERNON H. CHELDELIN and ROBERT R. WILLIAMS, J. Nutri- ion **26**:417 (Oct.) 1943.

he average diet consumed by the middle two thirds three fourths of the population of the United States r to the use of enriched bread and flour contained roximately 1.4 mg. of riboflavin, 11 mg. of nicotinic d and 4.9 mg. of pantothenic acid per 2,500 calories. se values are appreciably lower than the most gen- ly accepted daily requirements. The enrichment of ad and flour increased the level of riboflavin to 1.6 and of nicotinic acid to 17 mg., meeting the pre- ing standards.

he principal contributors of these vitamins to ordi- y diets are as follows, in the order of their impor- ce: for riboflavin, milk, white bread, eggs and po- es; for panthothenic acid, white bread, milk, eggs potatoes. Tables are presented to permit the cal- ation of the amounts of each vitamin provided by ious diets.

FREDEEN, Kansas City, Mo.

ILD NUTRITION IN CHILE. GUILLERMO MORALES BELTRAMI, Bol. Inst. internac. am. de protec. a la infancia **17**:27 (July) 1943.

he nutrition of children in Chile presents, in gen- l, the following deficiencies: (*a*) lack of sufficient tein; (*b*) lack of the fats which are most suitable the diet of children; (*c*) excess of carbohydrates; deficiency in vitamins; (*e*) deficiency in iron, cal- m and magnesium, and (*f*) deficiency in fruits and en vegetables.

he essential reasons for the inadequacy of the rage diet are the scarcity of milk, which is expensive and not of good quality, the limited purchasing power of the average family and the lack of knowledge of nutrition and of the care of children in general.

The technical protectional services can start a campaign in behalf of rational nutrition for children by establishing a program of education in the care of children, especially in relation to nutrition, by making recommendations to the authorities who control the production of food, by recommending to the government the adoption of all measures which directly or indirectly contribute to raising the average standard of living of the population and by equipping the institutions for the assistance of children as centers for supplying the people of the working class with good milk at low cost.

EDITOR'S SUMMARY.

PRESENT NUTRITION PROBLEMS OF THE UNITED STATES AS THEY AFFECT CHILDREN. Prepared by the Children's Bureau, United States Department of Labor, Bol. Inst. internac. am. de protec. a la infancia **17**:47 (July) 1943.

Although standards for judging the nutritional status of children are as yet incomplete, such methods as are available have demonstrated the relation of nutrition to diet and of diet to economic status, agricultural resources and education. The war, with its great shifts of population and demand on transportation, has produced temporary difficulties in the availability of food. Also, the employment of mothers may easily interfere with the provision of adequate food for children. In this connection the importance of school lunches is increased. The laws requiring enrichment of bread with iron salts, thiamine nicotinic acid and dried milk may be expected to be beneficial. In the rationing of food special study is given to the needs of mothers and children. With proper distribution the supply of food is at present adequate.

LESLIE, Evanston, Ill.

THE PROBLEM OF NUTRITION IN PERU: ITS PRESENT CONDITION IN REGARD TO THE DIFFERENT PERIODS OF CHILDHOOD. MANUEL SALCEDO FERNANDINI, Bol. Inst. internac. am. de protec. a la infancia **17**: 111 (July) 1943.

Adequate nutrition for expectant mothers is the first step toward nutritional protection of future children.

Breast feeding should be widely encouraged (by providing lunchrooms for nursing mothers, subsidizing breast feeding and establishing stations for the dispensing of breast milk) as a means by which to secure and protect the health of preschool children.

School lunchrooms should be established in areas where children have to travel long distances to attend school.

FROM THE EDITOR'S SUMMARY.

Vitamins; Avitaminoses

THE RATIO OF ASCORBIC ACID, RIBOFLAVIN AND THIAMINE IN RAW AND PASTEURIZED MILK. ARTHUR D. HOLMES, CARLETON P. JONES, ANNE W. WERTZ and JOHN W. KUZMESKI, J. Nutrition **26**:337 (Oct.) 1943.

The ascorbic acid content of raw milk averaged 19.7 ± 0.18 mg. per liter and of pasteurized milk 15.9 ±

2.7 mg. per liter. The riboflavin content of raw milk averaged 1.51 ± 0.09 mg. per liter and of pasteurized milk 1.48 ± 0.01 mg. per liter. The thiamine content averaged 0.33 ± 0.02 mg. per liter in raw milk and 0.30 ± 0.03 mg. per liter in pasteurized milk. The ratios to each other of riboflavin, ascorbic acid and thiamine were computed for both the raw and the pasteurized milk.

FREDEEN, Kansas City, Mo.

A CASE OF VITAMIN D DEFICIENCY ASSOCIATED WITH CIRRHOSIS OF THE LIVER AND A DYSCRASIA OF CALCIUM AND PHOSPHORUS METABOLISM. H. F. FRASER, J. Pediat. **23**:410 (Oct.) 1943.

The author reports the case of a boy 18 years of age with a history of intrauterine exposure to chronic illness of the mother and with a diet definitely deficient in minerals and vitamins during the first years of life. There was advanced clinical rickets at 2 years of age associated with a moderate enlargement of the liver. No specific therapy was given until the child was 9 years old, when he was sent to the country for the summer and a great improvement in walking ability followed extensive exposure to sunshine.

At 18 years of age metabolic studies showed a dyscrasia in calcium and phosphorus metabolism which may be described as follows. There was a relatively constant urinary or endogenous excretion of calcium irrespective of the intake. The normal person with an intake of 0.4 Gm. excretes only about one fourth of the ingested calcium via the kidneys and the remainder in the feces; the patient reversed this ratio and excreted more calcium in the urine than in the feces.

In general, the balances for phosphorus were like those for calcium, with two chief differences: The derangement of the mechanism was even greater; a larger proportion of the phosphorus was excreted via the kidneys. Except during the two periods of low ingestion of phosphorus the patient maintained a positive phosphorus balance, whereas with a normal intake of calcium there was a negative balance.

Death occurred at 19 years from pulmonary tuberculosis. Necropsy observations which were pertinent showed that the dentin of the teeth was riddled with interglobular spaces and that the enamel was hypoplastic. The bones showed a definite thinning of the cortex, and the red marrow was hyperplastic. The two parathyroid glands which were isolated were normal, grossly and histologically. The liver displayed advanced portal cirrhosis.

FRASER, Bethesda, Md.

AN EVALUATION OF THE BLOOD AND URINARY THIAMINE DETERMINATIONS IN VITAMIN B_1 SUBNUTRITION. REUEL A. BENSON, C. MICHAEL WITZBERGE and LAWRENCE B. SLOBODY, J. Pediat. **23**:437 (Oct.) 1943.

Subnutrition in respect to vitamin B_1 does not present definite signs and symptoms and can be detected, at present, only by laboratory procedures. In a study on "healthy" children who were hospitalized and so could be closely observed, children with sufficient thiamine for tissue saturation fulfilled three criteria: (1) a daily intake of more than 900 micrograms (300 U. S. P. units) of thiamine and a thiamine-calory ratio of 400 micrograms per thousand calories; (2) an average of 150 micrograms or more of thiamine excreted daily in the urine, and (3) a urinary excretion of 20 per cent or more of the ingested thiamine.

The urinary excretion of thiamine of 75 ill children was then studied. Many of these children did not meet the foregoing criteria and presented varying degrees of unsaturation of the tissues with thiamine. A search for the causes of this unsaturation usually revealed an inadequate dietary intake of thiamine, an impaired absorption or an increased demand due to increased metabolism.

Test doses, which may be valuable in verifying the clinical states of deficiency or marked unsaturation of the tissues, gave variable and inconsistent results in children with slight tissue unsaturation (vitamin B_1 subnutrition).

A study was made of the levels of vitamin B_1 in the blood in patients with varying degrees of saturation and unsaturation of the tissues with thiamine.

One hundred and sixty-six children could be divided into four groups on the basis of studies of urinary excretion of thiamine. Group 1 consisted of 100 children who met the three criteria of saturation of the tissues with thiamine. The levels of blood thiamine in this group varied from 4.8 to 13.7 micrograms per hundred cubic centimeters, with a mean of 8.0 ± 1.1. Group 2 consisted of 29 children who were on the borderline as regards their vitamin B_1 nutrition. The levels of blood thiamine varied from 5.2 to 12.4 micrograms, with a mean of 8.3 ± 1.0. Group 3 consisted of 15 children whose levels of blood thiamine were definitely below normal, from 4.5 to 10.7 micrograms per hundred cubic centimeters, with a mean of 8.0 ± 1.3.

Thus in spite of unequivocal evidence of unsaturation of the tissues with thiamine as shown by the urinary excretion studies, the levels of vitamin B_1 in the blood were within the same range as those of the group of normal children. The conclusion was drawn that determinations of the amount of vitamin B_1 in the blood were useless for the detection of vitamin B_1 subnutritional states, that is, of unsaturation of the tissues with thiamine without clinical signs or definite symptoms. It seemed reasonable, however, to expect the level of vitamin B_1 in the blood to fall in instances of severe clinical thiamine deficiency, and this has been shown to occur. The amount of vitamin B_1 held in the blood apparently does not fall until the stores of the vitamin in the tissues are almost exhausted.

BENSON, New York

EFFECT OF CECECTOMY AND SUCCINYLSULFATHIAZOLE ON VITAMIN K SYNTHESIS. K. G. WAKIM, M. M. KRIDER and HARRY G. DAY, Proc. Soc. Exp. Biol. & Med. **54**:164 (Oct.) 1943.

Young rats raised on a diet deficient in vitamin K were subjected to cecectomy and two days after operation were given succinylsulfathiazole. Of the 17 animals studied severe hypoprothrombinemia developed in 15 and within three months nearly all had died from hemorrhage. If given 2-methyl-1,4-naphthoquinone, the prothrombin time returned to normal. Of 9 animals similarly fed and operated on but not given the succinylsulfathiazole, 7 showed a normal prothrombin time and 2 showed only a slight increase. Animals fed and operated on but given succinylsulfathiazole showed only a slight increase in the prothrombin time.

HANSEN, Minneapolis

Hygiene; Growth and Nutrition; Public Health

MATERNAL MORTALITY IN PARAGUAY. RICARDO ORTIZ OSORIOLA, Bol. Inst. internac. am. de protec. a la infancia **16**:253 (Oct.) 1942.

The author at the beginning of his work praises the fortitude of Paraguayan women.

statistical report from 1908 to 1917 shows that per cent of the infants born were girls and that per cent of the total deaths occurred in girls and n, that is, fewer girls were born while the number ths among women was higher than among men. m 1920 to 1940, 5,607 women died, 13.3 per cent diseases due to pregnancy, from childbirth or from es subsequent to childbirth. Forty-six and three- per cent of these deaths were due to puerperal emia; 15.4 per cent to other puerperal affections, er cent to albuminuria and eclampsia, 4.6 per cent erperal tetanus and 1.2 per cent to embolism. Of others from 15 to 50 years of age, 300 might have saved.

e author believes that the way to avoid this ca- y is by improving the rural environment, by ing the present hut into a comfortable home. He es the establishment in each settlement of special ls to teach such subjects as child care, domestic e and care of the sick. The people of the working s should be taught the advantages of adequate ion; in this task the agencies of primary education ublic health should cooperate. Finally the author asizes the importance of extending services for rotection of mothers and children and points out ecessity of establishing maternity clinics and clinics mergencies in areas where there are no hospitals.

From the Editor's Summary.

NIZATION OF THE SERVICES OF NUTRITION FOR CHOOL CHILDREN. PERLINA WINOCUR, Rev. de g. y med. Escolar. **2**:85, 1943.

e Department of Elementary School Health of National Council of Education in Argentina fulfils ad function by compensating in one way or another he deficient nutrition of school children. It pro- them either with a daily glass of milk or with l meal at school canteens. These benefits are also ved by weak, undernourished children attending air schools and summer camps.

e department carries out an educational program y in the clinic of nutrition.

From the Author's Summary.

Prematurity and Congenital Deformities

ENITAL MALFORMATIONS INDUCED IN RATS BY MATERNAL NUTRITIONAL DEFICIENCY: V. EFFECTS F A PURIFIED DIET LACKING RIBOFLAVIN. JOSEF ARKANY and ELIZABETH SCHRAFFENBERGER, Proc. oc. Exper. Biol. & Med. **54**:92 (Oct.) 1943.

om previous work (Warkany and Nelson: *Science* 83, 1940) it was found that congenital malforma- developed in the offspring of female rats fed on w cornmeal, wheat gluten, calcium carbonate and m chloride plus vitamin D and that these abnor- ies could be prevented by supplementing the ma- l diet with 2 per cent dried pig liver. In these es a different diet consisting of sucrose, casein, table oil and salt mixed with various vitamin lements save riboflavin was fed to 21 female rats he Sprague-Dawley strain, mated to normal males he same strain which were on adequate diets, with production of 74 young rats. Ten of these newborn als showed abnormalities of the type which the er diet produced. These malformations consisted hortness of the mandible, tibia, fibula, radius and ulna, fusion of the ribs, sternal centers of ossification, syndactylism, bradydactylism and cleft palate.

Hansen, Minneapolis.

Newborn

THE COMPARATIVE EFFECTS OF AMMONIATED MERCURY, SULFATHIAZOLE, AND SOAP AND WATER ON THE SURFACE BACTERIA OF THE NEWBORN INFANT. WALTER R. MACLAREN, J. Pediat. **23**:446 (Oct.) 1943.

The subjects of this study were 42 healthy newborn infants. Each received a careful cleansing with soap and water within twelve hours after birth. Thirteen of the infants were then given one generalized application of 2.5 per cent ammoniated mercury ointment and on each succeeding day received only a light bath with sterile cottonseed oil. Fourteen of the infants were given one generalized application of 7.5 per cent sulfathiazole ointment and similar cottonseed oil baths. Fifteen were given no applications of ointment but were given a bath with soap and water on alternate days and were rubbed with cottonseed oil each day. The ointments used were prepared with a petrolatum and hydrous wool fat base.

Cultures were made of material taken from the skin of all infants at twenty-four hour intervals during the first five days of life by means of a wire loop dipped in sterile broth. The cultures were grown on blood agar.

For the five days following a single application of either drug there was a much slower rate of increase of bacteria on the skin than was found with the use of soap and water alone. The effect of the two drugs was approximately the same.

Staphylococcus albus, staphylococcus aureus and beta hemolytic streptococci were, in the order named, the organisms most commonly isolated. Fewer beta hemolytic streptococci were found after the use of sulfathiazole.

No absorption of the drug or cutaneous irritation was demonstrated from the use of sulfathiazole, which suggests that it is preferable to ammoniated mercury or soap and water alone in the care of the skin of the newborn infant.

MacLaren, Los Angeles.

PHYSIOLOGY OF THE HEMATOPOIETIC SYSTEM IN INFANTS AND YOUNG CHILDREN, INCLUDING THE BLOOD PICTURE AT BIRTH AND IN YOUNG INFANTS. PEARL LEE, J. Pediat. **23**:676 (Dec.) 1943.

The newborn infant begins life with a blood picture peculiar to the age group, characterized by an increase in number of most of the cellular elements and the presence of a few immature cells. Rapid changes, caused mostly by physiologic factors, take place during the first few weeks, greatly reducing the hemoglobin content and the number of red cells. After three months slow recovery begins.

From the Author's Summary.

THE PATHOGENESIS OF FETAL ERYTHROBLASTOSIS. PHILIP LEVINE, New York State J. Med. **42**:1928 (Oct. 15) 1942.

Three forms of fetal erythroblastosis are recognized: congenital hydrops, icterus gravis and anemia of the newborn. Some women have all except, perhaps, their first infants so affected. Recent studies on the causes of accidents resulting from intragroup transfusions have resulted in the discovery that immunization of the

mother by one or more blood factors present in the fetus but not in the mother is responsible for these accidents and also for fetal erythroblastosis. The obstetric histories of these mothers show abortions, miscarriages, stillbirths, neonatal deaths and cases of toxemia. Isoimmunization of the mother by blood factors in the fetus occurs; then the maternal immune agglutinins penetrate the placenta and act on the susceptible fetal blood.

The Rh factor, which is inherited as a simple mendelian dominant, is transmitted from the father to the fetus and immunizes the mother with Rh-negative blood. The anti-Rh agglutinins are best demonstrated in the mother's blood soon after the delivery of an infant with erythroblastosis; even then in not more than 50 per cent of the cases can it be detected. The discovery that the father's blood is Rh positive and the mother's Rh negative establishes the diagnosis for a child in whom this condition is suspected. This is especially helpful in borderline cases. A mother with Rh-negative blood artificially inseminated with serum from a male with Rh-negative blood should have a normal child. In order to prevent accidents in transfusions donors with Rh-negative blood should, of course, be selected for patients with such blood.

An increased incidence of congenital malformations in infants with erythroblastosis has been reported. Other conditions, such as abortions, miscarriages, stillbirths, neonatal deaths, eclampsia, icterus neonatorum and icterus gravis, may be due to factors yet to be discovered. "Incompatibility of the blood groups of the mother and fetus may possibly play a role in inducing either early or late fetal death."

AIKMAN, Rochester, N. Y.

Acute Contagious Diseases

INTRADERMAL TEST FOR SUSCEPTIBILITY TO AND IMMUNIZATION AGAINST WHOOPING COUGH USING AGGLUTINOGEN FROM PHASE I HAEMOPHILUS PERTUSSIS. EARL W. FLOSDORF, HARRIET M. FELTON, A. BONDI and AIMS C. MCGUINNESS, Am. J. M. Sc. **206**:421 (Oct.) 1943.

From a study of 650 children with known histories of pertussis it appears that the purified agglutinogen of Haemophilus pertussis should provide an excellent reagent for assisting in control of whooping cough.

Classification of immune and susceptible persons on the basis of the cutaneous test with purified pertussis agglutinogen agrees with classification according to the histories of incidence of infection and vaccination with H. pertussis. The test procedure can also be used as a means of stimulation of immunity following primary vaccination. In persons having an existing immunity to pertussis at the time of the test an increase is produced in the agglutination titer. In persons with no initial immunity, repeated test doses will produce a reversal of the reaction and a measurable agglutination titer. The reagent gives promise of value at the time of epidemics, not only to determine persons who are susceptible but to increase the degree of immunity in persons having but a partial immunity to pertussis.

HENSKE, Omaha.

THE TREATMENT OF MENINGOCOCCUS CARRIERS WITH SULFADIAZINE. F. S. CHEEVER, B. B. BREESE and H. C. UPHAM, Ann. Int. Med. **19**:602 (Oct.) 1943.

A total of 8 Gm. of sulfadiazine administered during a period of seventy-two hours was found to be effective in clearing the nasopharynx of meningococci in ad
No untoward effects were noted.

READING, Galveston, Texa

EXPERIMENTAL INVESTIGATION OF MEASLES. GEOF
RAKE, J. Pediat. **23**:376 (Oct.) 1943.

The virus of measles has been cultivated in ti
culture and on the chorioallantois or in the amniotic
allantoic cavities of the developing chick emb
Chorioallantoic cultivation has been most freque
used, and in twenty-seven attempts seventeen str
have been established. One of these has been car
through one hundred and twenty passages during m
than seventeen months.

The egg passage material has been inoculated
children by subcutaneous, intradermal and intran
routes, the last by means of either a drip or a fi
nebulized spray. Mild measles has been produce
the majority of children, particularly by intradermal
jection or intranasal spray. The types of measles
can be divided into moderate, mild or minimal, and
in the moderately severe cases malaise and cough
absent or very slight. Of 839 children inoculated
followed carefully, 450, or 54 per cent, have sho
definite signs of measles.

This mild "measles inoculata" can be passed by c
tact to susceptible persons, and the severity of the
ease is not enhanced by such passage. There are as
insufficient data as to the degree of protection agai
the natural disease afforded by vaccination.

RAKE, New Brunswick, N. J.

PROTECTION OF THE INFANT AGAINST DIPHTHE
DURING THE FIRST YEAR OF LIFE FOLLOWING TH
ACTIVE IMMUNIZATION OF THE PREGNANT MOTHE
J. LIEBLING and H. E. SCHMITZ, J. Pediat. **23**:4
(Oct.) 1943.

The purpose of this publication is to present th
effect of actively immunizing pregnant women and t
relate the effect of this immunization on the infa
during the first year of life.

Diphtheria antitoxin titers were determined on bo
the mothers and the infants at six weeks and thr
months after the birth of the infants. Antitoxin tite
were ascertained by the Moss-Jones modification metho
and the Schick tests were done in the usual manne

The results showed that active immunization of th
pregnant mothers produced an increased placent
transfer of passive immune bodies to the offspring.

The newborn infants of these actively immuniz
mothers gave negative reactions to the Schick test
birth and in some these reactions remained negati
at 7 and 13 months of age; others showed a positi
reaction from 9 months to 1 year of age. Howeve
the increased transfer of passive immune bodies to th
offspring is prolonged sufficiently to increase the pro
tection during the first year of life.

Schick tests on pregnant mothers immune to dip
theria acted as a secondary antigenic stimulus, causin
increased antitoxin formation. This stimulus wa
sufficient to prolong the passive immunity in the infan
of this group of mothers. The Schick tests on infan
immune to diphtheria did not increase the antitox
titers.

The authors conclude that the transplacental transfe
of the immune bodies to the offspring is sufficient t
protect the infant during the first year of life and
that a Schick test performed as a routine procedur
on the pregnant mother would have a twofold purpose

It would demonstrate and separate the immune ers from those not immune and (*b*) at the same serve as a secondary stimulus to the mothers who negative reactions to the test. Those who showed positive reaction would require active immunization.

SCHMITZ, Chicago.

ANTILE PARALYSIS: ITS DESCRIPTION AND TREATMENT. ELIZABETH KENNY, New Orleans M. & S. J. 96:134 (Oct.) 1943.

The author stresses her view that the disorders of cular physiology which occur in poliomyelitis are muscle spasm, (2) mental alienation and (3) muscle ordination. The method of care is discussed, and reasons for failure of the treatment are pointed out.

BERKLEY, Beverly Hills, Calif.

EVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES, Pub. Health Rep. **58**:1625 (Oct. 29) 1943.

For the period of Sept. 12 to Oct. 9, 1943, the incice of poliomyelitis was the highest reported in the ited States since 1931. The epidemic appeared in all tions of the country except the South Atlantic and st South Central. The incidence of meningitis was reased in all sections. The number of cases of asles was the highest for this period in the last een years, and the incidence of scarlet fever was per cent above the median. The total death rate m disease was 5.2 per cent above the median.

SANFORD, Chicago.

PHTHERIA IN THE MIDDLE EAST. T. A. MACGIBBON, Edinburgh M. J. **50**:617 (Oct.) 1943.

While serving in a tented hospital in Egypt, the hor observed 71 cases of diphtheria in adults, 52 of ich were proved by laboratory studies. Forty-nine re faucial and pharyngeal. There were also nasal l nonrespiratory complications, namely, wounds, ert sores, burns and cutaneous lesions. The freency of complications of diphtheria despite antitoxin rapy was unusual even for an adult group. Comcations were most frequent in the faucial type. euritis and myocarditis were the most common comcations, being nearly equal in frequency. Paresis s usually of the descending type. The myocarditis s severe enough to be the cause of death in 3 cases. e author discusses the symptoms of the latter comcation. The difficulty of diagnosing the least comon diphtheria lesions and the failure of adequate treatnt with antitoxin to prevent complications which tend the average period of hospitalization from sixty one hundred and thirty-one days provoked him to ge active immunization of all military personnel.

NEFF, Kansas City, Mo.

HE SCHICK TEST IN YOUNG ADULTS. N. E. GOLDSWORTHY and H. WILSON, M. J. Australia **2**:349 (Oct. 30) 1943.

Forty-six per cent of 109 nurses and 60 per cent of 6 university undergraduates reacted positively to the chick test. The proportion of reactors was higher an would be expected from statements in some standrd textbooks. This discrepancy is probably explained the effect of environment—social status, size of comunity, density of population. The problem of imunity to diphtheria is discussed with respect to (1) immunity as shown by the Schick test, (2) antitoxic immunity and (3) clinically effective immunity.

GONCE, Madison, Wis.

Acute Infectious Diseases

THE TREATMENT OF DYSENTERY CARRIERS WITH SUCCINYLSULFATHIAZOLE: OBSERVATIONS ON THE MINIMAL EFFECTIVE DOSE. PAUL S. BARKER, Am. J. Digest. Dis. **10**:443 (Dec.) 1943.

Succinylsulfathiazole was given to three dysentery carriers in amounts of 0.147, 0.195 and 0.220 Gm. per kilogram of body weight daily. These amounts did not successfully eliminate the dysentery bacilli from the stools when given for seven days, but when given for fourteen days they were effective. A fourth patient did not respond to 0.166 Gm. of the drug per kilogram daily for fourteen days but was rendered free from dysentery bacilli by the administration of 0.25 Gm. per kilogram daily for five days. A fifth patient recovered spontaneously from the carrier state.

Although relatively small amounts of succinylsulfathiazole are effective if administration is continued for a long time, it would seem more practical to give at least 0.25 Gm. per kilogram daily for five to seven days. This amount should uniformly eliminate dysentery bacilli from the stools of carriers in a short time.

MORRISON, Savannah, Ga.

SALICYLATE THERAPY IN RHEUMATIC FEVER: A RATIONAL TECHNIQUE. ALVIN F. COBURN, Bull. Johns Hopkins Hosp. **73**:435 (Dec.) 1943.

The author believes that infection is an essential component of the rheumatic reaction and is not modified by salicylate therapy. So long as the infection is active, the patient is subject to inflammatory reactions in the heart and in the vascular tissues throughout the body. The author's observations indicate that the inflammatory reaction may be suppressed and the development of the stigmas of heart disease may be prevented by the administration of large doses of sodium salicylate (10 Gm. daily).

The article is too long to abstract completely; it should be read by all persons interested in this subject.

LYTTLE, New York.

ON THE ANAPHYLACTIC NATURE OF RHEUMATIC PNEUMONITIS. ARNOLD R. RICH and JOHN E. GREGORY, Bull. Johns Hopkins Hosp. **73**:465 (Dec.) 1943.

In preceding papers we have shown that cardiac and arterial lesions having the basic characteristics of those of acute rheumatic fever can be produced experimentally as a result of anaphylactic hypersensitivity. The present comparison of the peculiar lesion of rheumatic pneumonitis with that of pneumonitis caused by hypersensitivity to the sulfonamide drugs shows that the two are basically identical and that both exhibit the primary damage to the capillaries which is characteristic of focal anaphylactic reactions. This similarity provides additional evidence in support of the view that the lesions of acute rheumatic fever may be anaphylactic in origin.

FROM THE AUTHORS' SUMMARY.

REPELLANTS IN MALARIA CONTROL. S. ANNECKE, South African M. J. **17**:383 (Dec. 25) 1943.

As a repellant to Anopheles gambiae and Anopheles funesta, which are largely responsible for the natural

transmission of malaria in the whole Ethiopian region, oil of citronella, plain or fortified, is superior to oil of Tagetes and to a cream containing powdered pyrethrum and naphthalene.

GONCE, Madison, Wis.

Chronic Infectious Diseases

PRIMARY TUBERCULOSIS COMPLICATED BY BRONCHIAL TUBERCULOSIS WITH ATELECTASIS (EPITUBERCULOSIS). EDNA M. JONES, T. N. RAFFERTY and H. S. WILLIS, Am. Rev. Tuberc. **46**:392 (Oct.) 1942.

Tuberculosis in children develops in a variety of ways. In the majority there is a relatively uneventful recovery to the condition known as the end picture of the primary complex. In some patients extrapulmonary disease develops. Some have an irregular course in which tuberculous pneumonia or extensive pulmonary tuberculosis is diagnosed. Among the latter is a rather large group whose main disorder is not tuberculosis but pulmonary atelectasis, heretofore classified as epituberculosis. Among 716 children admitted to the sanatorium, roentgenograms of 85, or 12 per cent, showed the homogeneous shadow of so-called epituberculosis. Bronchoscopic examinations were made on 42 of these children, and 31 were found to have bronchial distortion or disease, chiefly narrowing of the lumen by pressure from enlarged lymph nodes at the root or by a tuberculoma or an ulcer. The obstruction produced may develop slowly or rapidly, continuously or intermittently. The general condition produced by these factors is also variable and may not show the so-called classic signs of atelectasis such as an elevated diaphragm, narrowed interspaces or a shifted mediastinum. The end result of any such obstruction is a functionless lobe, which may be shrunken and without air, normal or increased in size, or may have fluid replacing the air.

The term epituberculosis is no longer needed and should be abandoned.

EUGENE SMITH, Ogden, Utah.

PHYSICO-CHEMICAL PROPERTIES OF THE ARSPHENAMINES IN RELATION TO DISTRIBUTION AND RETENTION IN THE TISSUES. F. B. RODMAN and HAROLD N. WRIGHT, J. Pharmacol. & Exper. Therap. **79**:140 (Oct.) 1943.

Arsphenamine and neoarsphenamine can be separated into colloidal and crystalline fractions. In view of the marked difference in both therapeutic and toxic properties of the crystalloid and the colloid fractions of the arsphenamine, it appeared desirable to investigate possible differences in the affinity for and the storage in tissues of these separated fractions, since these might have an important bearing on the question of cumulative poisoning. The authors, therefore, investigated this subject in rats (308), making 3,400 separate analyses. The excellent paper is too long and detailed for simple abstraction, but the conclusions (in greater part) follow:

1. The colloid fraction of both arsphenamine and neoarsphenamine is the portion of these drugs which is retained for the longest time. It penetrates into the tissues readily, as is shown by the sharp rise in arsenic in the tissues in the early time periods, and it also appears to be relatively firmly held by the tissues, since it is reexcreted slowly into the blood stream. The arsenic which is returned by the tissues to the blood stream is in turn eliminated from the animal body only with considerable difficulty, since a considerable portion of the injected colloid fraction was found to be still present in the blood stream at the end of thirty
The greater part of the colloid fraction was fo
the blood and the liver, but the skin, the muscle
bones and the intestinal tract also took up large
centages of the injected colloid fraction. All the
examined showed retention of the colloid fracti
a longer period than was shown by either the
drug or the crystalloid fraction.

2. The crystalloid fraction showed a high degr
initial penetration of the drug into the tissues
subsequent rapid lowering of their concentrati
arsenic. The excretion of the crystalloid fr
from the tissues is much faster than that of
the whole drug or the colloid fraction.

3. The whole drug occupies an intermediate po
but with a decided tendency to follow more closel
greater and more prolonged retention pattern o
colloid fraction.

4. The distinctive affinity of arsphenamine for
liver and of neoarsphenamine for the kidney has
confirmed and elaborated.

5. When injected into rats in equivalent doses
arsphenamine is retained by practically all ti
(except the blood and those of the gastrointestinal t
to a greater extent than arsphenamine, regardle
its physicochemical characteristics.

PILCHER, Clevela

USE OF BACTERIAL ASPHYXIA FOR HOMOLOGOUS
TIGEN PRODUCTION IN EXPERIMENTAL IMMU
TION AGAINST HUMAN-TYPE TUBERCULOSIS.
MAN SQUIRE POTTER, Proc. Soc. Exper. Bio
Med. **54**:143 (Oct.) 1943.

The growth removed from 10 one month old gly
agar cultures of human tubercle bacilli was place
Pyrex glass tubes with a small amount of water
sealed under a vacuum to remove oxygen. Deat
the bacilli was proved by culture and animal ino
tion. A total of 33 rabbits was immunized by
weekly subcutaneous injections of approximately 1
of the asphyxiated vaccine. Four months later
rabbits together with a similar number of co
animals were inoculated intravenously with vir
tubercle bacilli. Four and 3 animals of each g
respectively, inoculated within three to six months,
of nontuberculous causes. After eight to ten m
the animals were killed in pairs and examined gr
and microscopically. Twenty-four of the immu
rabbits showed no lesions of tuberculosis, whereas
of the control animals showed evidence of tubercul
The authors state the belief that parasitic asphyxi
a new principle to be used in the study of immu
and should be tried for study on human and a
tuberculosis.

HANSEN, Minneapol

TUBERCULIN INDEX IN PUBLIC SCHOOL CHILD
JOAQUIN ENRIQUE HERRAN, Rev. de hig. y
escolar. **2**:7, 1943.

The tuberculin index was studied in 953 school
dren chosen by the district medical inspectors to g
summer camps supported by the National Boar
Education of Argentina. The schools attended by
children are situated in the twelve districts that inc
the greatest part of the federal district exclusive o
suburban area. A tuberculin index of 37.78 per
was found for a group of children with an average
of 9.05 years.

The financial conditions of the children's homes
classified, as good when the income allowed 35 pes

or each member of the family; as fair when it from 25 to 35 pesos per person, and as bad allowed less than 25 pesos per person. It was hat the families of 14.79 per cent of the children n good, 18.78 per cent in fair and 66.42 per cent financial condition.

children averaging 9 years of age the tuberculin was 41.81 per cent for those attending school s supported by the National Board of Education, 10 per cent for those attending open air schools ed by the National Board of Education. The ity between the tuberculin indexes for groups of n attending school canteens and those chosen to summer camps may be due to similarity in the environment even though they belong to zones city which do not exactly coincide.

From the Author's Summary.

ases of Blood, Heart and Blood Vessels and Spleen

Mechanism of Auricular Paroxysmal Tachycardia. P. S. Barker, F. N. Wilson and F. D. inston, Am. Heart J. **26**:435 (Oct.) 1943.

idence is brought forth to show that auricular ysmal tachycardia is caused by circus rhythm involves either the sinoauricular or the auriculo-cular node.

Gibson, Chicago.

udy of Hemoglobin Metabolism and Hematology in a Case of Congenital Hemolytic undice During (*A*) Clinical Crisis, (*B*) Repeated Transfusions, and (*C*) Before and After lenectomy. Robert C. Lowe, Am. J. M. Sc. 6:347 (Sept.) 1943.

ase of congenital hemolytic jaundice is presented ich the chemistry of the blood and the excretion gment were studied during the course of a crisis uring repeated transfusions and after splenectomy. ring the crisis certain observations indicated a de- in hepatic function which cleared spontaneously. was no evidence of severe destruction of blood These changes have been observed also in crises kle cell anemia. The observations suggest the that hepatic disease may be a factor in the crises h attacks. Transfusions were followed by a pro- ve enlargement of the spleen. There then occurred crease in destruction of blood cells and a decrease number of erythrocytes and reticulocytes and amount of hemoglobin. It is probable that the used red cells were sequestered in the spleen and y destroyed, leading to the high excretion of bilin.

lenectomy was followed by a return to normal in umber of red blood cells, the amount of hemoglobin, rcentage of reticulocytes and the excretion of pig- The bilirubinemia and all clinical symptoms and disappeared.

Henske, Omaha.

enital Heart Block: A Study of Two Cases Healthy Adults. Thomas C. Jaleski and ugene T. Morrison, Am. J. M. Sc. **206**:449 Oct.) 1943.

e authors report 2 cases of congenital heart block. first patient, who had been studied for four years, a healthy adult with no cardiac symptoms and no other apparent anomalies. The second patient, whose condition had been followed from birth, had had no cardiac symptoms except for some syncopal attacks. This patient's case is of particular interest in that she has had two normal pregnancies without any disturbing symptoms.

Henske, Omaha.

Influence of Alimentation on the Regeneration of Plasma Proteins Following a Single Severe Nonfatal Hemorrhage. Carl E. Lischer, Robert Elman and Harriet W. Davey, Am. J. Physiol. **139**:638 (Aug.) 1943.

The authors conclude that the presence or absence of exogenous sources of protein or carbohydrate does not influence the rapidity with which the body compensates for the acute loss of plasma protein during the first seventy-two hours after a single severe nonfatal hemorrhage.

Nourse, Cleveland.

The Early Radiologic Recognition of Mitral Valve Disease. Bernard S. Epstein, J. Pediat. **23**:381 (Oct.) 1943.

The earliest cardiac enlargement due to mitral valve disease which can be seen roentgenologically is an enlargement of the left auricle. This is best identified by examining the patient fluoroscopically in the right anterior oblique position after administering a bolus of barium sulfate. Posterior deviation in the course of the esophagus in the region of the left auricle is of diagnostic significance. This change may occur when the heart presents a normal frontal silhouette and has been found more reliable than measurements made from the teleroentgenograms and tables of patients' heights and weights. Roentgenologic examinations of the heart should be made with this in mind. A diagnosis of a functional murmur should not be made if there is definite roentgenologic evidence of left auricular enlargement.

Epstein, Brooklyn.

Experiences with the Rh Substance in Transfusion Reactions. R. W. Koucky, Minnesota Med. **26**:980 (Nov.) 1943.

The author warns us that the new data concerning the Rh substance should be received with enthusiasm but at the same time should not obscure the many lessons previously learned regarding the successful management of blood transfusions. After reviewing the records of 16 cases and checking his observations with those found in a large number of references he concludes that the Rh substance is in general similar to the A and B substances which determine the division of blood into its four groups. Persons with Rh-positive blood cannot become sensitized. In mothers with Rh-negative blood antibodies may develop from the fetus during pregnancy or after transfusion. The Rh substance varies greatly in its antigenic property; some people become sensitized very readily, while others either form no antibodies or do so only to a slight degree. The antibody which can be demonstrated in the laboratory is the agglutinin. Apparently other types of antibodies are formed which are not detected by laboratory tests but will produce transfusion reactions or erythroblastosis in the fetus. The absence of demonstrable agglutinins, therefore, does not exclude the presence of other dangerous antibodies.

Stoesser, Minneapolis.

HAEMOLYTIC ANAEMIAS. L. J. DAVIS, Edinburgh M. J. **50**:589 (Oct.) 1943.

The author gives a survey of recent views on hemolytic anemias. After defining the anemias and the mechanism of cell destruction, he outlines the methods of investigation. In addition to careful history, physical examination and usual laboratory studies on peripheral blood and sternal marrow, he stresses a careful recording of such a manifestation as fecal urobilinogen, which would point to intracellular destruction. Hemoglobinuria would indicate intravascular hemolysis. Therapeutically these are important, as pointed out by Haden; splenectomy would not be expected to be of benefit if the pathologic condition is due to intravascular destruction, unless it is assumed that the diffusible lytic agent may emanate from the spleen.

He classifies the anemias according to their known or supposed cause: (1) abnormality of the red cells; (2) hemolysis; (3) parasitic infection of red cells; (4) poisons exerting lytic or other action on red cells; (5) hypersensitivity to drugs or other agents; (6) unknown cause associated with known predisposing factors, and (7) cause completely unknown. He proceeds then to discuss the pathologic picture of each with particular reference to the mechanism of destruction. His description of familial acholuric jaundice, erythroblastosis fetalis and lead poisoning will be of interest to the pediatrician, as will his discussion of nocturnal hemoglobinuria, of anemia associated with burns and neoplastic disease and of acute hemolytic anemia of unknown cause.

NEFF, Kansas City, Mo.

THROMBOCYTOPENIC PURPURA. HORACE EVANS and KENNETH M. A. PERRY, Lancet **2**:410 (Oct. 2) 1943.

Of 75 patients with thrombopenic purpura treated at the London Hospital between 1927 and 1938, 30 had not reached puberty. They were equally divided between the sexes. Ten patients recovered spontaneously; splenectomy was successful in the treatment of 5 boys and unsuccessful in the treatment of 4 girls. The mortality during the period of observation was 16 per cent.

Other forms of treatment that were used without apparent benefit were the administration of vitamins C, K and P.

LANGMANN, New York.

A FATAL BLOOD TRANSFUSION REACTION APPARENTLY DUE TO THE RH FACTOR. N. C. NEWTON and A. H. TEBBUTT, M. J. Australia **2**:109 (Aug. 7) 1943.

The authors report the case of a woman aged 48 who had had four normal children and one miscarriage at the sixth week of pregnancy and who was admitted to the hospital for treatment of uterine hemorrhage of thirteen weeks' duration. The first blood transfusion produced a severe reaction, and a second transfusion, given ten days later, was fatal. The woman's red cells were Rh negative, and her blood serum contained anti-Rh agglutinins in a titer of 1 in 8. Unfortunately, Rh determinations were not made on blood of the husband or the donors, but, on the basis of incidence, it is assumed that their blood was Rh positive.

GONCE, Madison, Wis.

A PRELIMINARY NOTE ON THE RELATIONSHIP OF BLOOD PLATELETS TO THE MECHANISM OF H[A]STASIS. G. REID, M. J. Australia **2**:244 (Sep[t.] 1943.

A vasoconstrictor substance liberated when the platelets break down plays a part in checking h[e]rrhage from arterioles and larger vessels. The "thrombocytin" is suggested for this substance. [T]is no evidence in the literature nor could the a[u]demonstrate that the vasoconstrictor substance d[e] from platelets causes capillary constriction.

Patients suffering from thrombopenic purpura prolonged bleeding times and reduced numbers of p[la]lets yielded serum possessing only feeble vasoconstr[ic] activity (the test object being an isolated spiral of carotid artery from an ox).

The blood platelets of a patient suffering from thrombopenic purpura did not differ from normal p[la]lets with respect to the liberation of "thrombocyti[n]

GONCE, Madison, W[is.]

Diseases of Nose, Throat and Ear

FACTORS INFLUENCING THE DURATION OF ACUTE T[ON]SILLITIS. M. TAMARI and ALEX M. BER[G] Illinois M. J. **84**:269 (Oct.) 1943.

In the analysis of a large number of cases of a[cute] tonsillitis at the Illinois Charitable Eye and Ear I[n]firmary, it was found that changes of season not o[nly] increased the number of cases but prolonged the d[u]tion of acute tonsillitis and increased the numbe[r] complications.

Other conditions which decrease the general resist[ance] of the person and prolong the duration of acute to[n]litis are rickets, anemias, tuberculosis and other d[e]bilitating diseases. Streptococci and pneumococci [are] mostly responsible for acute tonsillar infections. L[ocal] conditions extending an attack of acute tonsillitis [are] chronic infections of the teeth and the mouth, chr[onic] sinusitis and chronic infections of the larynx, trachea and the bronchi.

Swabbing, painting and washing in the crypts, as [well] as suction of the tonsils during acute attacks, [are] mechanical therapeutic efforts which retard the nor[mal] healing process. Infections of stumps or larger tonsi[llar] remains are marked by more painful and more p[rol]onged duration. Another factor influencing the nor[mal] course of acute tonsillitis is incomplete radium [or] roentgen therapy.

BARBOUR, Peoria, Ill.

TREATMENT OF VINCENT'S ANGINA OF THE TON[SILS] C. S. LINTON, J. A. M. A. **123**:341 (Oct. 9) 19[43]

Linton briefly comments on the therapy of Vincent angina with particular reference to the cases encou[n]tered in the armed forces. In addition to his discus[sion] he presents a few case reports.

Of all the methods of treatment the following h[as] been adopted as the simplest and most practical: 0.5 Gm. sulfathiazole tablet is dissolved on the ton[gue] every two hours during the day and a 1 Gm. tab[let] dissolved on the tongue every four hours during [the] night; this plan is to be continued for two days,

time the patient will either discontinue it voluntarily because symptoms have disappeared or continue a little longer if necessary. If infection is present about the gum margins, it is advised that the thiazole tablet be moistened with a few drops of water to make a paste and this rubbed into the gum margins.

GORDON, Philadelphia. [ARCH. OTOLARYNG.]

PREVENTION OF EAR AND NASAL SINUS COMPLICATIONS OF THE COMMON COLD. DAVID A. DOLOWITZ, W. E. LOCH, H. L. HAINES, A. T. WARD JR. and K. L. PICKRELL, J. A. M. A. **123**:534 (Oct. 30) 1943.

These authors discuss in moderate detail the bacteriology of the common cold with particular emphasis on the pyogenic organisms responsible for the complications that so often occur in the ears and the nasal accessory sinuses.

Their method of investigation consisted of a bacteriologic and clinical study of patients arranged in groups, one group being treated by the technic soon to be outlined, another being used as a control and a third not participating in the experiment but reporting to the infirmary with complications of the common cold. Each patient was carefully examined daily with transillumination, with a nasal speculum, especial emphasis being placed on pus or secretions under the anterior ends of the middle turbinate, and with a nasopharyngoscope. Material from the nose, the nasopharynx and the pharynx was cultured before treatment was begun and daily thereafter until the patient was discharged.

The primary object of the treatment was not to cure common colds, for they were probably initiated by a virus infection, but to prevent the bacterial infections of the sinuses, the ears and the pharynx that so commonly follow colds.

The treatment consisted of spraying the nose and the pharynx with a 2.5 per cent solution of sulfadiazine in ethanolamine solution, the control group receiving the solvent alone; those not participating in the experiment were managed by the usual empiric methods.

Bacteriologic studies show that the sulfadiazine spray does not sterilize the nose and the throat with the occasional exception of beta hemolytic streptococcus infection. Many patients with a red, edematous pharynx and constitutional symptoms due to streptococcic infection are cured within twenty-four hours both bacteriologically and clinically by using only 20 to 25 cc. of the 2.5 per cent sulfadiazine solution as a spray. In order to get this result it is imperative that the treatment begin as soon as possible after the sore throat is noticed, and while the bacteria are still on the surface. The results are not so good if the treatment is begun after the fourth day of the disease. Other strains of streptococci and pneumococci do not disappear or noticeably diminish in numbers in the cultures, but the clinical results suggest that they lose their virulence or their ability to become virulent.

Extension of infection to the sinuses, the ears or the pharynx is rare in properly treated patients.

Sensitivity to these medicaments was discussed, although it was not observed in this series of experiments. The authors, modest in their conclusions, infer that this subject should be given further consideration by medical investigators.

GORDON, Philadelphia. [ARCH. OTOLARYNG.]

SINUSITIS AND INFECTIONS SECONDARY TO THE COMMON COLD. F. M. TURNBULL, W. E. HAMILTON, E. SIMON and M. F. GEORGE JR., J. A. M. A. **123**: 536 (Oct. 30) 1943.

After the work of Turnbull, who reported that use of a 5 per cent solution of the sodium salt of sulfathiazole brought relief from the symptoms of chronic sinusitis, the authors set out to investigate further. They found that this solution was unstable when exposed to light and air and that crystallization and discoloration were the rule.

They added sodium sulfite and found that the solution was then stable to air, light and heat. A vasoconstrictor, dl-desoxyephedrine hydrochloride (discovered by Ogata in 1919 and like the original sulfanilamide a "sleeper" for twenty years), was found compatible with sodium sulfathiazole and actually formed a new sulfonamide drug, desoxyephedronium sulfathiazole.

Synergism developed so that only a small portion of the vasoconstrictive agent was necessary to achieve the hoped-for results.

Packs saturated with the substance were placed in the acutely swollen membranes of the nasal cavity and kept in situ for twenty to thirty minues.

The clinical studies were applied over a wide range and in cases of acute, especially severe, disease, in which the mucosa was engorged. The patient was placed in the modified Proetz position and was given at five minute intervals instillations of 10 to 15 drops of this solution until the congestion of the tissues was sufficiently reduced to give relief from pressure.

Home treatment consisted of instillations of drops or sprayings at five minute intervals, usually two or three, until the deeper tissues of the nose were reached.

Acute pharyngitis and laryngitis were treated by spraying the nose and the throat and, in office treatments, the larynx and the upper part of the trachea.

Acute suppurative otitis media was treated by myringotomy and insertion of medicated tampons in patients treated in the office and by drops in the ear, the nose and the epipharynx when the treatment was given by the patient at home.

Chronic suppurative otitis media was treated by instillation of drops of solution of hydrogen peroxide followed by insertion of tampons; home treatment consisted in the prescribed use of drops.

All of these measures were found safe and effective.

The authors emphasize that the methods outlined are not to be considered a cure-all, nor can they supplant indicated surgical treatment.

GORDON, Philadelphia. [ARCH. OTOLARYNG.]

WORKING WITH SPEECH DEFECTIVES IN PUBLIC SCHOOLS. HILDRED SCHUELL, J. Speech Disorders **8**:355 (Dec.) 1943.

The author discusses the methods by which children with various defects in speech, such as stuttering, delayed speech and the defects due to cleft palate, are handled in the public schools with the assistance of the school nurse and the school psychologist.

PALMER, Wichita, Kan.

PREVENTION AND TREATMENT OF ACOUSTIC TRAUMA. GEORGE E. SHAMBAUGH JR., J. Speech Disorders **8**:369 (Dec.) 1943.

The most common type of loss of hearing observed after acoustic trauma is a decrease in sensitivity to sounds with a frequency of approximately 4,096, and

the next most frequent type is complete loss of hearing. Temporary or permanent damage to the nerve cells in the inner ear always occurs.

Prevention is essential since there is no treatment for acoustic trauma. The following preventive measures are suggested: 1. Routine audiometric testing should be done on all persons, such as aviators, who are exposed to excessively loud noises. 2. Persons susceptible to acoustic trauma should be transferred to quieter surroundings. 3. Excessive noise should be controlled by the use of improved designs for engines, machinery and buildings. 4. Where noise cannot be reduced, aural protectors should be worn. The most important preventive measure is repeated routine audiometric testing.

PALMER, Wichita, Kan.

A SECOND STUDY IN THE AFFECTIVE VALUE OF SPEECH SOUNDS. JON EISENSON, JEROME FISHER and SYLVIA G. SUCHER, Quart. J. Speech **29**:457 (Dec.) 1943.

In this study 69 deaf subjects, of whom 34 had congenital defects in hearing but had been taught oral speech, were questioned as to whether they considered certain speech sounds pleasant or unpleasant. Both persons with normal hearing (from a previous experiment) and deaf persons reacted to most isolated speech sounds as being pleasant. Both normal and deaf persons agreed that "z," "j," "th," hard "g," "zh" and "wh" are unpleasant sounds.

PALMER, Wichita, Kan.

A PREDISPOSING CAUSE OF STUTTERING. JOHN M. FLETCHER, Quart. J. Speech **29**:480 (Dec.) 1943.

An important predisposing cause of asynergic movements, such as those observed in stuttering, is the fact that a person has only indirect control over the muscles involved in such movements, since the asynergies disappear when the remotely controlled muscles are eliminated.

PALMER, Wichita, Kan.

CONGENITAL CYST OF THE LARYNX. JANE I. DAVIDSON, Lancet **2**:508 (Oct. 23) 1943.

Congenital cysts of the larynx are rare. They may manifest themselves at birth or give rise to no symptoms until adult life. Those which cause symptoms at birth are commonly fatal if not promptly recognized. Cure by simple aspiration has been reported. The diagnosis can be made by laryngoscopy or by palpation.

Only 15 cases of the condition in infants have been reported.

A case is reported in which the patient, an infant, died on the twenty-fourth day of life. At autopsy a cystic swelling about 5 mm. in diameter was found on the left wall of the larynx, almost completely occluding the orifice.

LANGMANN, New York.

Diseases of Lungs, Pleura and Mediastinum

THE ISOLATION AND IDENTIFICATION OF PATHOGENIC FUNGI FROM SPUTUM. JOSEPH M. KURUNG, Am. Rev. Tuberc. **46**:365 (Oct.) 1942.

The foreword by Harry A. Bray best describes the manual which is incorporated in this number of the *American Review of Tuberculosis.*

"Diseases of the lung due to infection by fungi have been regarded as extremely rare. Recent studies, however, have disclosed that such infections are not uncommon and that the pulmonary lesions encountered are as varied in nature as those in tuberculosis. The diagnosis usually is established by the recovery of offending fungus from the sputum. Their identifica may prove a formidable task to those not familiar the subject. The terminology and classification is cult to master and the morphology and cultural ch acteristics vary widely.

"The manual presents the essential laboratory cedures and the conditions required for optimal cult tion of the pathogenic fungi found in the sputum. age of the culture and the magnification adopted for microscopical study are exactly stated, an import feature. The appearance of the colony and the mic scopical details are liberally illustrated. It would s that the information contained in the manual sho suffice for the identification of the offending fungu the sputum."

EUGENE SMITH, Ogden, Utah.

CHRONIC ASPIRATIVE BRONCHOPNEUMONIA IN YOU INFANTS. A. CASTELLANOS, RAÚL PEREIRAS, VALDÉS DÍAZ and B. SÁNCHEZ SANTIAGO, Arch. med. inf. **12**:191 (Oct.-Dec.) 1943.

This interesting article is profusely illustrated w roentgenograms and with photomicrographs of tiss from the lung of 2 infants with chronic pneumo processes due to aspiration of milk. The authors diff entiate the condition from pulmonary steatosis due to disturbance of lipid metabolism. In both instances th was no initial acute asphyxia, no oily laxatives h been used, the patient had not received intranasal stillations of cod liver oil. The roentgenograms the infants were distinctive, but the final diagnoses we made from pneumograms taken after the introducti of air through capillary punctures. Chemical inves gation showed that the cells did not contain liqu petrolatum or cod liver oil; the lipid was derived fr milk. The authors wish to emphasize the importa of capillary puncture as a means of diagnosis of obsc pulmonary conditions.

SANFORD, Chicago.

Diseases of the Gastrointestinal Tract, Liver and Peritoneum

HEPATIC DAMAGE ASSOCIATED WITH SULFONAMI THERAPY IN INFANTS AND CHILDREN: I. MO PHOLOGIC PATHOLOGY. MAUDE L. MENTEN a MARIE A. ANDERSCH, Ann. Int. Med. **19**:609 (Oct 1943.

Thirty-eight of a total of 299 necropsies perform on children who had been treated with sulfonami compounds showed hepatic disease. Toxic necrosis the liver was found in 3 cases, toxic central necro in 9 cases and serous hepatitis with early centr necrosis in 26 cases.

There appeared to be no relationship between t types or severity of the hepatic disease and the amou of the sulfonamide drug or drugs administered.

READING, Galveston, Texas.

HEPATIC DAMAGE ASSOCIATED WITH SULFONAMI THERAPY IN INFANTS AND CHILDREN. II. CHANG IN LIVER FUNCTION TESTS. MARIE A. ANDERSC Ann. Int. Med. **19**:622 (Oct.) 1943.

Gray's test of hepatic function was used in a study 106 patients. The serums of 73 of these children we tested periodically during treatment with sulfonami drugs, and single determinations were made for t serums of the remaining 33. Twenty-four of the

wed varying degrees of positive reactions to the gs; 49 showed no change in reaction during therapy.

READING, Galveston, Texas.

PTIC ULCERS IN INFANCY AND CHILDHOOD. MIRIAM C. BENNER, J. Pediat. **23**:463 (Oct.) 1943.

The author reports postmorten studies of children m 2 days to 11 years of age, 7 of whom had duoal and 1 of whom had gastric ulcers. Two of the ldren were newborn infants. One of the cases s unusual in that there was a history of gastroestinal symptoms though the infant was only 3 days age. The other case of ulcer in an infant was rkable in that severe inflammation was present in ulcer, a rare condition in an age period when ers are thought to be due almost exclusively to scular accidents at the time of birth. In 2 cases ers were found in association with severe infectious ease of the central nervous system. In 1 of these appearance of the ulcer indicated that it was of chronic type and that it antedated the onset of the ease of the nervous system. Two cases in which y scars of previous ulcers were present are included the report to emphasize the possibility of ulcers curring without symptoms and healing without specific atment. Only 1 child had lesions of the gastric musa, and in this instance the ulcers were superficial d probably terminal. One case is of interest because the association of ulcer with possible poisoning by ubarb leaves.

BENNER, Denver.

UNDICE AND CONDITIONS ASSOCIATED WITH THIS PHENOMENON. MADELEINE FALLON, J. Pediat. **23**:721 (Dec.) 1943.

Jaundice in newborn and older infants and in children classified on the basis of destruction of blood, obuction in the liver or in the biliary passages and struction of hepatic tissue.

Icterus neonatorum, infectious jaundice, anomalies the bile ducts, erythroblastosis and familial jaundice discussed, and the difficulties encountered in the fferential diagnosis are illustrated with histories of ses.

It is believed that the Rh factor sets the stage for ythroblastosis but that it is not the sole cause. milial jaundice is classified as mild, moderate and vere. In cases of severe and sometimes of moderate milial jaundice splenectomy must be done early to oduce a cure. The article is illustrated with roentnograms showing the skeletal changes which occur in milial jaundice.

FALLON, Los Angeles.

Nervous Diseases

ROWTH ASYMMETRY DUE TO LESIONS OF THE POSTCENTRAL CEREBRAL CORTEX. WILDER PENFIELD and J. S. M. ROBERTSON, Arch. Neurol. & Psychiat. **50**: 405 (Oct.) 1943.

From a study of the exposed brains of patients with cal epilepsy, the authors describe pathologic changes the central nervous system associated with asymmetry growth. They conclude that the latter condition is used by failure of growth on one side rather than pertrophy of the other side and that this failure in owth is due to cortical injury (evidenced by scars). patients with bodily asymmetry the lesions were in the region of the central fissure, and they had occurred by the time the patient was 2 years of age.

BEVERLY, Chicago.

BLOOD-SUCKING VECTORS OF ENCEPHALITIS: EXPERIMENTAL TRANSMISSION OF ST. LOUIS ENCEPHALITIS (HUBBARD STRAIN) TO WHITE SWISS MICE BY THE AMERICAN DOG TICK, DERMACENTOR VARIABILIS SAY. RUSSELL J. BLATTNER and FLORENCE M. HEYS, J. Pediat. **23**:371 (Oct.) 1943.

Since the epidemic of acute encephalitis in the St. Louis area which occurred in the summer of 1933 and recurred in the summer of 1937, the mode of transmission of St. Louis encephalitis has been of special interest. While the general consensus has seemed to favor droplet infection, certain features of this disease suggest the possibility of a blood-sucking vector. These features are discussed.

Experiments are described which give evidence that the common dog tick, Dermacentor variabilis Say, is capable of being infected by the virus of St. Louis encephalitis through feeding on inoculated animals and, once infected, can transmit the virus to normal susceptible animals by bite. Further, a female can transmit the infection to her offspring through the egg, and the infection may persist through all stages of metamorphosis into the second generation. A tick once infected remains infected for at least four months. Thus far the virus of St. Louis encephalitis has not been recovered from ticks collected in nature, but no extensive studies of this problem have been undertaken.

It is not the opinion of the authors that the dog tick is the natural vector responsible for the transmission of St. Louis encephalitis virus to man. No history of tick bite has been obtained in any case of St. Louis encephalitis observed. However, it is possible that the tick may play a role in the natural epidemiology of the disease by maintaining the virus as an endemic focus in lower animals and that the virus may be carried to human beings by another blood-sucking vector, such as the mosquito, possibly Culex tarsalis, as the work of Hammon suggests. The present work is of theoretic significance, since it represents the first successful transmission of the virus of St. Louis encephalitis to experimental animals by a blood-sucking vector.

BLATTNER, St. Louis.

THE EFFECT OF HEAD INJURY ON HEARING. W. E. GROVE, J. Speech Disorders **8**:363 (Dec.) 1943.

Lesions resulting in defective hearing are restricted to the eighth nerve or the cochlear contents. Examination for hearing is not reliable in the early days after injury due to the disturbed condition of the sensorium. Repeated examinations are necessary in each case, for medical or legal purposes, for the detection of malingering. A history of the case should be elicited. Two hundred and eleven cases of proved fracture of the skull were studied, and 49 cases of fracture involving the base of the skull. There was perceptive deafness in 45 cases. In unilateral, longitudinal fracture, the function of hearing is more damaged as age increases. The perceptive type of deafness is most common. The ear on the side of the fracture sometimes shows a greater loss of hearing than its fellow, but in a large number of instances the loss is the same in both ears. In 65 per cent of the cases of bilateral longitudinal fracture there was loss in perceptive hearing. Labyrinthine fracture produced total deafness on the affected side in every instance and some loss on the opposite side in most

instances. One person had a complete loss of hearing as a result of labyrinthine fracture. Patients may regain a great deal of hearing even a month after an accident. If deterioration of hearing does not occur in the first six months, the condition will probably remain stationary.

The author discusses the methods recommended by the American Medical Association for evaluating loss of hearing. These methods probably will not be useful in evaluating the amount of loss suffered by men in the armed forces because of the method in which hearing is tested at the time of induction.

PALMER, Wichita, Kan.

Psychology and Psychiatry

INFLUENCES OF WAR AS EVIDENCED IN CHILDREN'S PLAY. ELEANOR PALMER BONTE AND MARY MUSGROVE. Child Development **14**:179 (Dec.) 1943.

The influences of war as evidenced in children's play were studied in eleven kindergarten and two church preschool groups in Honolulu, Territory of Hawaii, by means of direct observation, analysis of teacher's responses to questionnaires and analysis of children's paintings. The data were analyzed with reference to: (1) the manifestations of the influences of war in various activities of play; (2) the extent to which war play takes place and the proportion of children participating; (3) the degree of participation in war play in relation to sex, race and domestic background; (4) the initiating, terminating and overstimulating circumstances of war play, and (5) participation in war play in relation to social, emotional and psychologic factors. The interpretation stresses war play as merely another normal manifestation of the effects of environmental stimuli which retains all the values of normal play, which has no deleterious effect on social and emotional development and which even contributes to the development of some positive characteristics of personality. The authors conclude that there is no justifiable reason for suppressing war play and that with guidance by teachers positive educational values can be fostered. FROM THE AUTHORS' SUMMARY.

THE EFFECTS OF EARLY INSTITUTIONAL CARE ON ADOLESCENT PERSONALITY (GRAPHIC RORSCHACH DATA). W. GOLDFARB, Child Development **14**:213 (Dec.) 1943.

This is a report of one phase of an experimental and observational investigation of 15 adolescents whose rearing during the first three years of life had been in an institution for infants and whose subsequent experience was in foster homes (institution group). These children were contrasted with an equated group of 15 children whose major experience had been with foster families and whose total experience had been with families (foster home group).

The children reared in institutions showed a greater deviation from the "normal" graphic Rorschach pattern than did the children from foster homes. The deviation manifested itself in unusual adherence to the "concrete" attitude and in inadequate conceptualization. The "concretivity" is specifically represented in such qualities as apathy in relation to environment and behavior that is unreflective, unaccountable and without conscious purpose. Thus the graphic Rorschach data tend to confirm the observations and conclusions based on other investigative devices which also showed that the children from institutions are clearly differentiated from those from foster homes. The characteristics of children f institutions inferred from the mass of data are an impoverished, undifferentiated personality, with ficiency in inhibition and control, and (2) passivity apathy of personality.

FROM THE AUTHOR'S SUMMARY

PSYCHIATRIC PROBLEMS IN ADOLESCENCE. D SLIGHT, Illinois M. J. **84**:255 (Oct.) 1943.

Since the emotional reactions and habits are still f and have not yet crystalized, the adolescent has acquired the more or less irreversible commitments life which so often complicate treatment of the neur adult. Thus, since the patterns are still flexible, prospects are better for alterations and readjustme of unhealthy habits and attitudes.

Among the most severe psychiatric disorders, schi phrenia is most common, and relatively few other ty are seen in early adolescence. More often than is b lieved, trends of a psychotic nature are present duri adolescence but are overlooked or misunderstoo Adolescence brings new problems in the mental d ficiencies, because of the new and increasing soc demands, the development of sexual conflicts and so o

Symptoms of the neuroses, such as obsessions a phobias, are common in adolescence. These sym toms are often concealed by the adolescent or appe in forms that are misunderstood. They are oft treated without recognition of the fact that they a due to emotional conflict.

Most of the psychiatric disorders of adolescence occ in general forms and are manifest as seclusiven undue indulgence in fantasies, disobedience to pare and teachers and irregular habits. There has been recent increase in offenses against persons, which a more serious than those offenses against property.

The most fruitful concept in psychopathology is t of conflict. The aim of education and training is develop a compromise or a balance whereby the pers can function physically, mentally and socially to t best advantage.

In the present generation there has been a remarkab disharmony in the process of social development. Thi because of the laudable advances in pediatrics, matern hygiene and other health efforts adolescents show remarkable development in physique, with physi maturity at an earlier age than in previous generation There have been an extension of the period of sch attendance and a raising of the age of going to wor In many cases there has been a resultant delay in t development of social maturity. This disharmony shou be kept in mind in considering the nature and t occurrence of psychiatric problems of the adolescent the time.

The development toward maturity may become fixe Then the adolescent fails to accept or acquire disc plined reactions and socially mature habits in keepin with his age. He may not only fail to progress; h may regress. Failure to solve the various conflic may result in mental symptoms or in visceral incoord nation.

In the diagnosis of the general disorders it must b determined whether the emotional difficulties are a transient and passing nature or indicate a deep conflict and whether they are due to external caus or to basic difficulties in the development of personalit The most important point to establish in diagnosis

capacity of the adolescent to face and overcome rebuffs and the frustrations of life.

n treatment it must be remembered that the difficul- of the child are often due to external circumstances ich can be altered. Some of the patterns of life are ng crystallized within, and to that extent a change thin is necessary. For young adolescents changes in ental attitudes and other factors in the social situa- ns as well as changes in the reactions of the patient st be attempted.

Some adults are still prone to rebuff adolescents who nt to talk about their emotional difficulties instead adopting attitudes that would make it easy for them reveal their intimate and personal difficulties. Group asures of prevention and treatment should be de- oped. A change in the public attitude toward psy- iatric disorders is needed. This militates against knowledgment of their presence or of the need for atment in the early stages.

Good results are often possible in the minor psychi- ic disorders with a few interviews on a friendly and objective basis that permits ventilation of the per- ns' difficulties. Many require only a sympathetic derstanding to get a new perspective. Their social ntacts and experiences should be established and en- rged through group activities of all kinds.

In some patients the factor of constitutional hyper- nsitivity may loom large in the causal process. These rsons require more time than their fellows to adopt w ways and to relinquish present habits and attitudes.

BARBOUR, Peoria, Ill.

Diseases of the Genitourinary Tract

HE IMPORTANCE TO THE ADOLESCENT GIRL OF GYNE- COLOGICAL EXAMINATIONS. EDWARD ALLEN, Illinois M. J. **84**:251 (Oct.) 1943.

Allen states the belief that many of the cases of imary amenorrhea, oligomenorrhea, adolescent menor- agia, essential dysmenorrhea, congenital erosions or alformation, and infantilism will someday be avoided further study and earlier treatment of the adolescent rl. Proper, early education of the child in the psy- ology and the physiology of sex will prevent many egitimate or unwanted pregnancies, with their con- quent criminal abortions and accompanying pelvic in- ctions. Further advances in endocrine and nutritional erapy will aid greatly in the care of those patients ho have been educated to come regularly for attention.

Pelvic examination of the adolescent girl should be ogressive. For an infant, careful inspection is usually fficient. Such inspection included in each subsequent ysical examination will lead the child to accept adily the more extensive palpatory and instrumental repubertal examination indicated before the onset of e menstrual flow. Subsequent examinations during e period of adolescence will obviate entirely those last inute premarital examinations which all too frequently d far too late uncover gross pathologic conditions or alformations.

BARBOUR, Peoria, Ill.

REATMENT OF CRYPTORCHIDISM. FLOYD E. HARDING, J. Pediat. **23**:451 (Oct.) 1943.

Cryptorchidism without mechanical obstruction may e corrected with hormonal therapy. That the admin- tration of chorionic gonadotropin caused descent of e testes in the cases reported was beyond doubt. here was a question as to whether the addition of pituitary gonadotropin increased the incidence of descent. Testosterone when added produced further enlargement of the parts, and this was an indication for its use. The testicles descended in 76 per cent of the 38 patients treated in this series. Since the number of patients with obstruction varies and it is usually impossible to diagnose which patients have obstruction, the prognosis varies. With endocrine treatment, obstruction can be diagnosed early so that the necessary surgical procedures can be performed not later than the prepuberty period; thus one prevents the atrophy that occurs in the testicles which is allowed to go through puberty undescended. Certain mental and physical conditions make it advisable to treat some of these boys at a younger age. The boys so treated became more muscular, played better, became broader through the shoulders, gained in height and were generally considered "more boy" in type. The problem children took orders, cooperated and developed a more mature attitude. There were increased dependability and fulfilment of necessary tasks with better grades at school. When descent does not follow treatment, orchidopexy must be used to prevent sterility, hypogonadism, complications and possibly the development of a malignant growth. Operation should be facilitated by the previous use of a treatment that induces lengthening of the spermatic cord and enlargement of the scrotum and testicle. In the cases reported no harm to the testicles could be detected, regardless of the age at which the boy was treated.

HARDING, Los Angeles.

OVARIAN CYST. J. F. MORANO BRANDI, Rev. Soc. pédiat. de la Plàta **4**:109 (Dec.) 1943.

A girl 12 years old had pain in the hypogastrium. A tumor could at times be palpated. At operation a cyst of the right ovary was found and removed. The pedicle of the ovary was unusually long, more than 15 cm. There was no gangrene or other complication.

HIGGINS, Boston.

Diseases of the Ductless Glands; Endocrinology

THE PRODUCTION OF HYPOTHALAMIC OBESITY IN RATS ALREADY DISPLAYING CHRONIC HYPOPITUITARISM. A. W. HETHERINGTON, Am. J. Physiol. **140**:89 (Oct.) 1943.

Ten rats hypophysectomized and observed for about eleven weeks showed no signs of obesity. Some, even after so long a time, had not attained their preoperative weight; others had surpassed it by a few grams only. They could be considered, therefore, to be in a state of chronic hypophysial insufficiency. Hypothalamic lesions were then produced in these animals by the Horsley-Clarke technic. Within three to four weeks they began to display rapid deposition of fat and eleven weeks after the second operation they were definitely obese. This evidence shows that the fat depots are still able to store excess fat in response to hypothalamic damage after they have suffered the changes in tissue metabolism presumed to be attendant on hypophysectomy. Since neither total nor partial hypophysectomy produces adiposity or prevents its appearance after hypothalmic damage is done, it is not likely that the hypophysis is involved in the production of obesity often associated with injury to structures in the pituitary region. Hypothalamic disorder appears to be the sole responsible factor.

NOURSE, Cleveland.

INACTIVATION OF ESTRONE AND DIETHYLSTILBESTROL BY MICROORGANISMS. BERNHARD ZONDEK and FELIX SULMAN, Endocrinology **33**:204 (Oct.) 1943.

It has been shown that estrone is inactivated in the liver and the spleen in warm blooded animals, in the body in cold-blooded animals, and in plants. Aqueous solutions of estrone kept for two months in the laboratory undergo a considerable loss of potency.

It appeared possible that micro-organisms which decompose estrone and diethylstilbestrol might be widespread, and it therefore seemed of interest to study the decomposition of these substances by various micro-organisms.

Of 32 nonpathogenic and 29 pathogenic strains of micro-organisms tested 2 of the former and none of the latter produced inactivation of estrone. The titer of a solution of estrone was tripled by contact with yeast.

JACOBSEN, Buffalo.

THE INTRASPLENIC INJECTION OF ESTROGENS AND THEIR ESTERS. ALBERT SEGALOFF, Endocrinology **33**:209 (Oct.) 1943.

Evidence has been gradually accumulating from diverse lines of investigation which would indicate that the liver is the site of extensive inactivation of estrogen. The author reports a series of experiments on rats, involving intrasplenic injection of estrogens, in which an attempt was made to quantitate the role of the liver in the process of inactivation.

JACOBSEN, Buffalo.

CONSTANCY OF ANDROGEN CONCENTRATION IN THE URINE. FRANKLIN HOLLANDER, BRUNO KRISS, EMANUEL KLEMPNER and ROBERT T. FRAN, Endocrinology **33**:217 (Oct.) 1943.

It has been generally believed that the quantity of androgenic substances excreted in the urine is independent of the urinary volume.

In 9 human subjects studied over a period of a month the concentration of biologically active androgens in the urine was constant and independent of the daily urinary output, even with forced and restricted fluid intakes. The total output of androgen per twenty-four hours showed considerable variation.

So far as is known, no other urinary constituent is present in a constant concentration independent of the volume of fluid excreted.

JACOBSEN, Buffalo.

INHIBITING EFFECT OF ADRENOCORTICOTROPIC HORMONE ON THE GROWTH OF MALE RATS. HERBERT M. EVANS, MIRIAM E. SIMPSON and CHOH HAO LI, Endocrinology **33**:237 (Oct.) 1943.

The authors conclude that the body growth of normal and gonadectomized male rats is inhibited by pure adrenocorticotropic hormone from sheep. The inhibition does not occur in adrenalectomized rats.

JACOBSEN, Buffalo.

INACTIVATION OF STILBESTROL BY LIVER IN VITRO. BERNHARD ZONDEK, FELIX SULMAN and JOACHIM SKLOW, Endocrinology **33**:333 (Dec.) 1943.

Diethylstilbestrol is inactivated by liver pulp in vitro but less rapidly than is estrone. It is suggested that this fact explains the greater oral efficiency and the toxic side effects of diethylstilbestrol in man.

JACOBSEN, Buffalo.

REPRODUCTIVE CAPACITY IN ADULT MALE R... TREATED PREPUBERALLY WITH ANDROGENIC H... MONE. JAMES G. WILSON and HARRIET C. WILS... Endocrinology **33**:353 (Dec.) 1943.

Male rats given injections of testosterone propion... showed defects in the structure and function of ... reproductive organs.

JACOBSEN, Buffalo.

RESISTANCE OF RATS TO POTASSIUM POISONING AF... ADMINISTRATION OF THYROID OR OF DESOXYCOR... COSTERONE ACETATE. BERTRAND E. LOWENSTEIN ... RAYMUND L. ZWEMER, Endocrinology **33**:361 (De... 1943.

Desoxycorticosterone acetate protected the normal r... from poisoning due to potassium chloride and induc... physiologic atrophy of the adrenal cortex. Feeding ... thyroid increased the toxicity of potassium chloride ... the normal rat and resulted in compensatory physiolog... hypertrophy of the adrenal cortex.

JACOBSEN, Buffalo.

TROPIC VERSUS-TROPHIC IN THE TERMINOLOGY ... THE PITUITARY HORMONES. GEORGE W. CORNE... Endocrinology **33**:405 (Dec.) 1943.

Corner gives clear evidence that the use of such ter... as adrenotropic and thyrotropic is contrary to a we... established prior use of the suffix in biologic terminolo... and actually reverses the cause and effect relationsh... intended. The suffix "trophic" seems more appropriat...

JACOBSEN, Buffalo.

STUDIES IN HORMONE THERAPY: I. THE EVALUATI... OF GROWTH HORMONE THERAPY. ALFRED A. STRAU... and ERNEST H. WATSON, J. Pediat. **23**:421 (Oct... 1943.

Standard tables of weight, height and other measur... ments of growth, admittedly inadequate for apprais... of apparently normal children, are entirely unsuitable ... guides in studies of growth-retarded children. Recours... was therefore made to the age unit method of Olson ... evaluate the effects of treatment with anterior pituitar... extracts rich in the growth hormone on such childre... Olson portrays data on growth (measurements of heig... in inches, weight in pounds) by translating them in... common age units. Thus weight is recorded as weig... age and height as height age by simply comparing t... crude measurement (pounds, inches) with Olson's table... (Olson, W. C., and Hughes, B. O.: Tables for t... Translation of Physical Measurements Into Age Uni... Ann Arbor, Michigan, The University of Michiga... Press, 1938.) This method has the advantage of re... dering understandable and usable data on growth co... lected in various types of units. Chronologic age f... each patient is, of course, a straight line, irrespective ... the form of the curve of original measurement... Against the patient's chronologic age line are graphe... his weight age, height age, dental age and mental ag... Deflections of these several curves immediately reve... periods of retardation, acceleration or arrest.

The growth of 4 children during six to eight year... including pretreatment, treatment and post-treatme... periods, is recorded by the above method. Judged b... the usual methods of appraisal the response to anteri... pituitary growth hormone was disappointing, but wh... graphically portrayed by Olson's age unit method ... favorable modification of the growth curves was evide... Such a modification is all that can be expected, a...

use of standard tables for appraisal of such modification is highly unsatisfactory.

This article includes a discussion of two additional methods of employing the age unit method to record growth and to appraise modifiers of growth. One of these makes use of the height ratio (height quotient).

WATSON, Ann Arbor, Mich.

OSTEODYSTROPHIA FIBROSA CYSTICA [OSTEITIS FIBROSA CYSTICA] AND JUVENILE HYPERTHYROIDISM. J. E. JACOBS, South. M. J. **36**:668 (Oct.) 1943.

The author reports 2 cases of juvenile hyperthyroidism in which there was osteitis fibrosa cystica with diffuse osteoporosis complicated by pathologic fractures. One patient is well three years after thyroidectomy. The other child, who has had no operative treatment, is still toxic, showing osteoporosis and pathologic fractures from time to time. Calcium and phosphorus metabolism in thyrotoxicosis are briefly discussed, and differential diagnosis is offered.

SCHLUTZ, Chicago.

Diseases of the Muscles, Bones, Joints and Lymph Glands

DETERMINATION OF BONE AGE IN CHILDREN. LOUIS A. LURIE, SOL LEVY and MAX L. LURIE, J. Pediat. **23**:131 (Aug.) 1943.

The authors describe a simple but accurate and inexpensive method for determining skeletal age of children. In this study the roentgenograms of various centers of ossification of 2,100 white children ranging in age from ½ to 19 years were examined. Of this number the records of only 1,129 children (704 boys and 425 girls) were used, the remainder being excluded because the children were suffering from either endocrine disorders or severe nutritional disturbances. Four roentgenograms were made in each case, the hand including the wrist, the elbow, the pelvis and the foot including the ankle.

Each child's roentgenograms were read from the standpoint of the time of appearance of the various centers of ossification as well as the time of their fusion. The results were tabulated on the basis of one year differences in age. Since girls show an accelerated skeletal maturation, separate charts were made for boys and girls.

The authors epitomize their data in two charts which portray graphically the degree of maturation of the various centers of ossification (epiphyses) which is present at any given age. From these charts, the physician can determine at a glance which epiphyses should be present, which are likely to be present and which are only infrequently present or fused at a given age. Conversely, the physician can quickly determine the skeletal age of his patient by comparing the actual conditions as shown on the films with the data on the charts.

A new term, bone quotient (B. Q.) is introduced. This is determined by dividing the skeletal age by the chronologic age. The resulting figure represents the percentage of normal maturation of the bones which has occurred. The bone quotient is of further value in diagnosing certain metabolic and endocrine disorders and also in furnishing a uniform basis for statistical studies and analyses.

SONTAG, Yellow Springs, Ohio.

THE EFFECT OF ILLNESS AND OTHER FACTORS ON THE APPEARANCE PATTERN OF SKELETAL EPIPHYSES. LESTER WARREN SONTAG and JANET LIPFORD, J. Pediat. **23**:391 (Oct.) 1943.

By converting the time of first appearance of centers of ossification as determined from regularly spaced roentgen examinations of the skeletons of the same children to Z scores, it is possible to compare the sequence of appearance of one child's centers with those of others. Each center of each child was compared with the yearly Z score mean of that child, and a center deviating from that mean by .6 sigma or more was designated as "aberrant." Monozygotic twins have the same centers aberrant significantly more often than siblings. Siblings have the same centers aberrant more often than randomly selected nonsiblings. The correlation coefficient for the Z scores of monozygotic twins was 0.82, for siblings 0.32 and for nonsiblings 0.06. There is evidence, therefore, of a genetic factor in sequence of appearance of centers of ossification.

The children with the most "aberrant" centers had had no more acute illnesses during the first six years of life than had the children with the least "aberrant" centers. Children with the most illness had no more aberrant centers than those with the least illness. There was no evidence, therefore, that acute illness tended to delay those centers about to appear at the time the illness occurred. Children with most acute illness had a more rapid appearance of centers than did those with least illness, although their order was not changed. The rate of appearance of centers of ossification in skeletal epiphyses varies tremendously from year to year in many children.

SONTAG, Yellow Springs, Ohio.

CONGENITAL SACROCOCCYGEAL TUMORS: CASE REPORT OF A TERATOMA. M. P. NEAL and J. B. CARLISLE, South. M. J. **36**:677 (Oct.) 1943.

The authors report a case of congenital sacrococcygeal teratoma with other anomalies and malformations, multiple fractures and partial dismemberment incident to delivery. The case confirms the statement, commonly made, that when one developmental defect occurs others are to be expected.

SCHLUTZ, Chicago.

AN EPIDEMIC OF POLYARTHRITIS IN THE NORTHERN TERRITORY. J. H. HALLIDAY and J. P. HORAN, M. J. Australia **2**:293 (Oct. 9) 1943.

The authors report an epidemic among soldiers of an acute febrile disease of unknown causation, characterized by a fleeting exanthem, mild fever, pain and swelling of joints and tender enlargement of lymph nodes. The disease runs a benign course of from one to four weeks and ends in complete recovery.

GONCE, Madison, Wis.

Skin Diseases; Allergy

EXPERIMENTAL EVIDENCE THAT LESIONS WITH THE BASIC CHARACTERISTICS OF RHEUMATIC CARDITIS CAN RESULT FROM ANAPHYLACTIC HYPERSENSITIVITY. ARNOLD R. RICH and JOHN E. GREGORY, Bull. Johns Hopkins Hosp. **73**:239 (Oct.) 1943.

In rabbits with experimental serum sickness valvular and myocardial lesions occurred which closely resemble those of rheumatic carditis and provide some support for the view that specific rheumatic lesions may be manifestations of an anaphylactic hypersensitive reac-

tion. The authors do not claim to have reproduced the disease picture as it occurs in man or to have settled the question of the pathogenesis of rheumatic fever.

LYTTLE, New York.

CRITICAL EVALUATION OF SKIN TESTS IN ALLERGY DIAGNOSIS. LOUIS TUFT, J. Allergy **14**:355 (July) 1943.

A comprehensive review of the status of cutaneous tests is presented. The author recognizes that there has been and still is criticism of cutaneous tests and of the methods of making them. He offers a number of sound and reasonable suggestions to meet these criticisms and to establish a recognized laboratory procedure.

HOYER, Cincinnati.

INHALATION OF OXYGEN AND 1:100 EPINEPHRINE HYDROCHLORIDE PLUS FIVE PER CENT GLYCERIN FOR THE RELIEF OF ASTHMATIC ATTACKS. STEPHEN D. LOCKEY, J. Allergy **14**:382 (July) 1943.

The addition of 5 per cent glycerin to a 1:100 solution of epinephrine hydrochloride relieves the dryness and irritation that result from the inhalation of epinephrine hydrochloride solution alone. The formula is given, and the method of preparation is described.

HOYER, Cincinnati.

TREATMENT OF ASTHMA AND HAY FEVER. A CONFERENCE BY STAFF MEMBERS OF CORNELL UNIVERSITY MEDICAL COLLEGE AND OF THE NEW YORK HOSPITAL. HARRY GOLD, ROBERT A. COOKE, C. H. WHEELER and JANET TRAVELL, New York State J. Med. **43**:1224 (July 1) 1943.

The term "hay fever" is used to represent all types of nasal allergy. Pathologically there are two types: vasomotor (with acute and completely reversible reactions) and hyperplastic (with chronic and nonreversible changes in tissue). The treatment depends on avoidance of the cause, immunization and symptomatic medication. The patient may move to pollen-free areas, he may live in air-conditioned surroundings, he may eliminate certain household agents, e. g., pillows, mattress, chairs, pets, foods, insecticides. As for treatment of symptoms, little can be done with drugs. In general, local nasal treatments (sprays, cauterization and packs) are to be avoided, for they increase the irritability of the tissues and their action is only temporary. As yet there is insufficient evidence that deficiency of any vitamin or dyscrasia of any endocrine gland has much to do with allergy save as it affects the general health. Foods, contrary to popular belief, "rarely cause trouble," but air-borne substances are common factors. Adenoids, tonsils and teeth must be investigated, but the "type of infection" may be hard to determine. Autogenous vaccines are preferred to "stock" vaccines. Cultures from the submucosa are preferable to cultures from the surface. Cooke makes the following comments: 1. Rarely is surgical treatment indicated for a patient under 25 years of age. 2. Allergy due to inhalants or foods should not be treated with allergens before or after operation. 3. Surgical work must be "superlatively well done." 4. Operations on sinuses must remove infected tissue and secure "drainage"; turbinates must be conserved; resection of the septum is done chiefly to make the surgical approach to a sinus easier. 5. Sinuses are often operated on piecemeal, incompletely or too late. 6. Patients (for surgical treatment) must be selected with an eye to their physical condition. Not much [illegible] be expected when chronic pulmonary fibrosis is pres[ent]

Cooke speaks of asthma as (1) atopic, in which [illegible] cause is determinable by cutaneous tests, or (2) in[fec]tive. The more difficult asthmatic patients are child[ren] who are continuously asthmatic but not completely d[is]abled. If contact with an allergen is unavoidable, [one] must try to immunize the patient. This may requ[ire] weeks, months or years and is vitiated by intercurr[ent] infections of the respiratory tract, which often prec[ede] sinusitis and asthma. "Children up to 18 years n[eed] little attention to the sinuses if recurring infections [can] be controlled, and the early removal of tonsils [and] adenoids is one of the best methods of control." Infe[c]tions of sinuses, especially those of the antrums, are t[he] most frequent causes of infective asthma. Teeth are, [of] course, important foci but are less important than oth[er] sources.

Summary by Dr. Walter Modell: The treatment [of] hay fever depends on whether the condition is of t[he] vasomotor or the hyperplastic type. If it is of t[he] former type, avoid the cause, immunize and treat sym[p]toms. If it is of the latter type, permanent changes [in] the tissues are likely, infection is probably present an[d] recourse must be had to the use of vaccines, surgic[al] procedures or purely symptomatic treatment. Patien[ts] with urgent symptoms—bronchial obstruction, for ex[-] ample—may require removal of bronchial plugs by su[c]tion or administration of oxygen. Oxygen is given [by] catheter rather than by mask. Dehydration sometim[es] helps bronchial obstruction. A diet low in salt and [in] sodium ash, together with sodium or potassium iodi[de] internally, plus catharsis may afford relief. Severe r[e]actions following the administration of allergens ma[y] require solution of epinephrine hydrochloride subcutan[e]ously or, in rare cases, intravenously.

VOORHEES, New York. [ARCH. OTOLARYNG.]

AN EPIDEMIC IN CHILDREN, CHARACTERIZED BY D[I]VERSITY OF LESIONS IN SKIN AND MUCOUS MEM[-]BRANES, PROBABLY CAUSED BY STREPTOCOCCUS PYO[-]GENES. P. B. MUMFORD and A. G. HEPPLESTO[N] Brit. J. Dermat. **55**:143 (June) 1943.

The authors describe a nonfatal epidemic infectio[n] affecting all of 27 children, aged 2½ to 5 years, in [a] colony of evacuees and several members of the adu[lt] staff. It persisted with remissions for more than s[ix] months.

About half the children had inflammatory lesions [of] the nose, eyes, mouth and skin. Six were confined t[o] bed and isolated with pyrexia and eruptions of varyi[ng] severity. The matron had a sore throat. The nursi[ng] sister in charge of the children had a papulovesicul[ar] eruption of the extensor aspects of the limbs, witho[ut] effect on her general health.

The distribution and appearance of the lesions in th[e] children suggested first an external irritant. Expose[d] areas of skin and mucous membranes were involved [and] the effects of constant scratching and rubbing we[re] obvious, and constitutional disturbance was considere[d] to be the result of secondary infection. Extensiv[e] patch tests with a rare type of grass with which th[e] children's playground had been sown were made o[n] the children with the worst eruptions, but all reaction[s] proved negative. Within a few weeks many mor[e] children were affected, and several were toxemic, wit[h] high temperature, rigor and prostration. As most [of] the colony were becoming involved and the epidemi[c] was growing out of control, bacteriologic investigation

re undertaken. A high proportion of patients were und to be harboring hemolytic streptococci of group A pe 4. Therapy with sulfonamide compounds was in-duced. Rapid amelioration of general and local mptoms followed, but every "cured" patient had a apse after fresh contact with other children.

BLUEFARB, Chicago. [ARCH. DERMAT. & SYPH.]

CASE OF PSEUDOMEMBRANOUS INTERTRIGO. ALICE CARLETON, Brit. J. Dermat. **55**:154 (June) 1943.

The author reports a case of rebellious pseudo-embranous intertrigo in a girl aged 7 months. There as a strong clinical resemblance to both cutaneous phtheria and moniliasis. The organisms producing e disease in this instance were staphylococci, strepto-cci, Pseudomonas pyocyanea and Proteus vulgaris.

BLUEFARB, Chicago. [ARCH. DERMAT. & SYPH.]

EACTION-PRODUCING ANTIGENS IN ECZEMA OF IN-FANCY AND CHILDHOOD. P. W. FARMER JR., M. J. Australia **2**:5 (July 3) 1943.

The results of cutaneous tests in 50 cases of eczema children are reported. Half the patients tested were tween 8 months and 5 years of age, and the remainder ere up to 13 years; 32 of the patients had bronchial sthma in association with eczema. By far the com-onest reaction-producing antigens were horse dander, g white and grass pollens.

GONCE, Madison, Wis.

Surgery and Orthopedics

OTASSIUM AND THE CAUSE OF DEATH IN TRAUMATIC SHOCK. ALEXANDER W. WINKLER and HEBBEL E. HOFF, Am. J. Physiol. **139**:686 (Sept.) 1943.

Increase in the concentration of potassium in serum as been repeatedly reported in various types of second-ry shock. It has been suggested that this elevated oncentration of potassium may be an important factor producing the characteristic picture of traumatic hock and may contribute to the fatal outcome. On the ther hand, the picture of potassium poisoning is totally nlike that of traumatic shock. Also, concentrations of otassium considerably higher than those commonly ound in the serums of persons with shock are neces-ary in order to elicit any clinical evidences of intoxi-ation. The present study endeavors to define as xactly as possible the role of potassium in one variety f traumatic shock.

The authors conclude that the concentration of po-assium in serum consistently increases when secondary hock is induced by reestablishment of circulation in an schemic limb. Death usually occurs with respiratory ailure prior to or simultaneous with cardiac arrest nd is usually not due to potassium poisoning. Con-entrations of potassium in the serum while both espiration and heart are active in the shocked animal eldom exceed 8 millimols per liter. These levels are oo low to cause any circulatory embarrassment; only inor electrocardiographic changes are induced. Ex-ceptionally, death may be due to cardiac arrest from pontaneous autointoxication with potassium. After espiratory arrest there may be a rapid agonal eleva-ion of the serum potassium. Such increases are the esult and not the cause of the terminal event.

NOURSE, Cleveland.

THE TREATMENT OF CONNECTIVE TISSUE FIBROSAR-COMA WITH SURGERY AND RADIUM. MILTON FRIED-MAN, Bull. Hosp. Joint Dis. **4**:66 (Oct.) 1943.

The author summarizes his conclusions as follows: "Local resection of a connective-tissue fibrosarcoma is commonly followed by a recurrence. Post-operative x-ray therapy, even in very large doses, will prevent only a small percentage of recurrences. The post-operative insertion of interstitial radium, in the form of radium needles or radon seeds, permits effective can-cericidal irradiation of the tumor-bearing area. How-ever, this procedure can be employed only in the case of those tumors which are located at a safe distance from bone or large blood vessels, because the large dose necessary to prevent recurrence may cause serious damage to these structures."

Two cases are reported in which this method was employed. The first patient was a girl 13 years old who had an infiltrating tumor in the lateral aspect of the right hip. Operative removal and treatment with radium took place in March 1940, and there had been no recurrence up to the time of writing. The second patient was a man 52 years old who was similarly treated in 1937; there had been no recurrence.

LESLIE, Evanston, Ill.

THE DESTRUCTIVE ACTION, IN VIVO, OF DILUTE ACIDS AND ACID DRINKS AND BEVERAGES ON THE RATS' MOLAR TEETH. E. J. MCCLURE, J. Nutrition **26**:251 (Sept.) 1943.

The results of these experiments on the effect of dilute acids on rats' teeth in vivo suggest the possi-bility that the oral surfaces of the teeth may be affected by acid fluids passing through the oral cavity. Any association of these effects with the initiation of dental caries remains to be determined.

FREDEEN, Kansas City, Mo.

FEET OF NORMAL CHILDREN. MEINHARD ROBINOW, MARGARET JOHNSTON and MARGARET ANDERSON, J. Pediat. **23**:141 (Aug.) 1943.

This is a study of lateral roentgenograms of the weight-bearing foot. The roentgenograms were ana-lyzed according to a method first described by Bertani and Moreau and published in the *Revista Argentina de Reumatologia*, December 1937. Calculation of the fre-quency distribution showed that in the group studied all the measurements fell within the range of normal variations. There were remarkably small changes in the arch with age, which shows that the arch is well developed relatively early in life. Removing all the load from one foot made the arch of that foot higher, but doubling the load on the foot had no appreciable effect. Shifting the main load to the anterior part of the foot resulted in a distinct flattening of the arch. That seems to show that the stress on the longitudinal arch is proportional to the weight born on the ball of the foot. A significant correlation was found between flatfoot, as shown by the roentgenograms, and prona-tion of the feet. In the films for older subjects there was a correlation between flattening of the arch and increased weight-length ratio, which tends to confirm the clinical impression of association between obesity and flattened arches. There was no correlation between such flattening and the age at which the children began to walk, nor did rickets appear to be involved in the causation of flatfoot. Genetic analysis suggested the possibility of a hereditary factor in the occurrence of flatfoot.

SONTAG, Yellow Springs, Ohio.

Teeth and Dentistry

IDIOSYNCRASY TO METALLIC MERCURY, WITH SPECIAL REFERENCE TO AMALGAM FILLINGS IN THE TEETH. MURRAY H. BASS, J. Pediat. **23**:215 (Aug.) 1943.

Idiosyncrasy to mercury may give rise to many curious clinical pictures. In sensitive persons the application to the skin of ointments containing small amounts of mercury may result in various eruptions (urticaria, erythema, edema and bleb formation), fever, at times hyperpyrexia, prostration and even unconsciousness. In children such symptoms are most commonly seen after the application of ointment of ammoniated mercury. The same child may be sensitive to many compounds of mercury. Two girls are described who at different times showed symptoms due to various preparations, mild mercurous chloride taken internally, a solution of mercury bichloride or an ointment of yellow mercuric oxide or of ammoniated mercury applied externally. Metallic mercury itself may also cause symptoms. In a girl shown previously to be highly sensitive to ammoniated mercury ointment, edema of the lips and face developed a day after a tooth had been filled with an amalgam. The filling was left in place and the redness and swelling disappeared in a few days. These symptoms were due to bits of the amalgam deposited on the cheek by the fingers of the dentist. Another child had the following history. At the age of 4 years she was given a dose of mild mercurous chloride, after which there developed a generalized eruption lasting two days. During an attack of chickenpox, application of a blue medicated soap (mercury bichloride) was followed by urticaria. At the age of 7, application to the eyelids of an ointment containing yellow mercuric oxide caused prolonged edema of the lids and face. At 12 and 13 filling the teeth with amalgam had been followed by circumoral swelling and a blotchy eruption on the lips and cheeks. At the age of 14 she was seen with severe, generalized, giant urticaria which had been present for ten days and had not yielded to any treatment. Three weeks previously she had had two teeth filled with amalgam. Symptoms of urticaria had appeared about ten days after this, and it was suspected that the cutaneous lesions might be an evidence of iodiosyncrasy to the mercury in the fillings. One of the fillings was removed. This was immediately followed by an aggravation of the symptoms; the child's feet became so edematous with urticaria that she could not wear shoes and her temperature rose to 102 F. The other filling was immediately removed; twenty-four hours later the symptoms disappeared, and the child remained well thereafter. Passive transfer tests with the child's serum showed a strongly positive reaction to ammoniated mercury.

Both mercury poisoning and symptoms of sensitiveness (idiosyncrasy) have been described following the filling of dental cavities with compounds of mercury. A third case of idiosyncrasy to metallic mercury is that of a small boy who had been playing with the metal, had spilled it and in scooping it up had gotten it against the skin of the abdomen and genitalia, resulting in a severe erythema of those parts, lasting for several days and accompanied by eosinophilia.

In summary, 3 cases of idiosyncrasy to metallic mercury are described; all the patients were children and all showed symptoms referable to the skin. In 2 instances metallic mercury applied to the skin was the active agent. In 2 amalgam fillings were the etiologic factor. In 1 of these symptoms of severe urticaria continued until removal of the fillings. This cause of urticaria may be more common than is ordinarily supposed.

SONTAG, Yellow Springs, Ohio.

ORTHODONTIA. A. C. MIRANDA, Rev. Soc. pédiat. de la Plata **4**:97 (Dec.) 1943.

Sucking is a common cause of deformation of the mouth; if a child is given a metal ring or tube with holes in it, sucking is prevented and yet the child has something to put in his mouth. A child should not sleep with his fist between the face and the pillow, nor should he lean his chin on his hand constantly while reading or studying.

Repeated colds cause changes in the nasal structure and the dryness of the air caused by modern heating puts an extra burden on the mucous glands. The dentist should investigate possible nasal abnormalities or pathologic conditions before he tries to correct irregularities of the teeth.

HIGGINS, Boston.

ORAL PROPHYLAXIS IN CHILDREN. E. DELLA CROCE, Rev. Soc. pédiat. de la Plata **4**:115 (Dec.) 1943.

Oral prophylaxis involves careful observation of the mother during gestation, proper diet for the child during infancy and childhood, correction of nasal abnormalities, avoidance of dental caries, prompt filling of cavities, retention of deciduous teeth until the permanent teeth are ready to erupt and avoidance of bad habits, such as sucking the thumb.

HIGGINS, Boston.

Miscellaneous

STUDIES ON SULFAPYRAZINE. HARRY J. ROBINSON, HENRY SIEGEL and OTTO E. GRAESSLE, J. Pharmacol. & Exper. Therap. **79**:354 (Dec.) 1943.

The authors conclude that sulfapyrazine and sulfadiazine produce about the same pathologic changes in rats after prolonged administration, that alkalization of the urine can lessen or prevent renal concretions and that in equal concentrations in the blood the two drugs are equally effective against experimental pneumococcic, streptococcic and staphylococcic infections.

PILCHER, Cleveland.

ANCIENT PROCESSES IN A SCIENTIFIC AGE. C. ANDERSON ALDRICH, New Orleans M. & S. J. **96**:2 (July) 1943.

The author stresses the point that infants have natural rhythmic reactions for feeding, intestinal evacuations and sleep. The pediatrician's effort should be to educate the parents in the technic of preserving these normal physiologic tendencies.

In the child's second year effort is to be expended on teaching the parents that a child must be allowed normally to expand his urge to walk, to run, to play, to handle things, to take things apart and to fit them together. Freedom to do this must be accomplished by removal of breakable and valuable objects and by approval rather than restraint of childish efforts, since the latter leads only to negativism.

A tolerant attitude to infantile behavior enables one to understand growth in later years, for example, to realize that a child reads when his brain has developed to the reading stage, not when he achieves a certain chronologic age. One can understand that handedness should be respected and that masturbation by an infant is only a stepping stone in sexual growth. One can

understand the problems of adolescents and realize it is right for them to mature, to take on responsibilities, to make love, to mate and to have children of their own. When adults have accomplished that degree of understanding, they, too, have really grown up.

BERKLEY, Beverly Hills, Calif.

DITIONAL MANIFESTATION OF SULPHATHIAZOLE TOXICITY. E. PRESS and M. KENNERSTEIN, Arch. Dis. Childhood **18**:50 (March) 1943.

Two cases are presented in which during treatment with sulfathiazole renal irritation, oliguria and azotemia developed, causing death. These disturbances were not accompanied by formation of calculi or anatomic changes sufficient to account for them. It is suggested that they are a toxic manifestation of sulfathiazole, which causes a change in function rather than in structure of the nephron.

KELLY, Milwaukee.

A CASE OF PHENOTHIAZINE POISONING IN SYDNEY. L. I. H. GRANT, M. J. Australia **2**:27 (July 10) 1943.

A girl aged 7½ years was given 2 Gm. of phenothiazine (thiodiphenylamine) a day for seven days, in the treatment of threadworms. On the ninth day the child's blood showed 1,810,000 red cells per cubic millimeter with some nucleated cells present, and a hemoglobin value of 40 per cent. A transfusion of fresh citrated blood and administration of a preparation of iron brought about complete restoration of the normal blood picture. The author cites a number of other reports of acute hemolytic anemia secondary to treatment with phenothiazine, and he states that "although this form of treatment is effective in intractable cases of threadworm infestation and attractive to administer, surely we cannot countenance its continued use."

GONCE, Madison, Wis.

Society Transactions

CHICAGO PEDIATRIC SOCIETY

HEYWORTH N. SANFORD, M.D., *President, in the Chair*

April 18, 1944

Myocarditis in Childhood. (Inaugural Thesis). DR. SIMON A. WILE.

So-Called Idiopathic Cardiac Hypertrophy in Infants. DR. BENJAMIN M. GASUL.

Rheumatic Fever in the Army from the Pediatrician's Point of View. MAJOR MARTIN WENDKOS, Medical Corps, Army of the United States.

The material presented embodied the results of experiences with rheumatic fever as it occurred in epidemic proportions among soldiers in and around Chicago during the years 1943 and 1944. Particular emphasis was placed on the diagnostic features of the disease and the reliability of symptoms: Physical signs and electrocardiographic findings were individually evaluated. In the main, it was noted that information obtained from frequent sequential electrocardiograms was the most dependable and incontrovertible, the repeated electrocardiograms being found essential because of the transient nature of the aberrations in these records. The nonspecific nature of the changes was also stressed, and it was demonstrated that other acute infections in which the heart is similarly involved can produce disturbances in conduction comparable to those which occur in rheumatic fever. The electrocardiographic aberrations on which the greatest reliance was placed consisted of first, second and third degree auriculoventricular heart block, delayed intra-auricular and intraventricular conduction, sinus bradycardia, wandering pacemaker and changes in the polarity, amplitude or configuration of the T wave in either the limb or the chest leads.

On the basis of the response to the hypodermic administration of 1/25 grain (2.4 mg.) of atropine sulfate, hypervagotonia was shown to be operative in the production of the various disturbances in conduction, a finding which extends the original work of Bruenn. It was demonstrated that first degree auriculoventricular heart block, second degree auriculoventricular heart block, nodal rhythm, delayed intra-auricular conduction and wandering pacemaker, which were accompaniments of active carditis in the disease, could be temporarily abolished by the parasympatholytic action of the drug. Evidence based on an original testing method developed by the author was presented to indicate that, conversely, the supplementary use of a sympatholytic drug such as ergotamine tartrate might provoke significant abnormalities of conduction which had not been registered in an initial record during the active phases of the rheumatic state. This procedure was therefore recommended as a helpful diagnostic adjunct for use when the identification of the rheumatic infection requires confirmatory objective data. A further analysis of the clinical material also revealed that the differential diagnosis between acute rheumatoid arthritis and acute rheumatic fever may be difficult because card involvement is a feature common to both syndro and because the arthritic manifestations are not inf quently indistinguishable. It was suggested also t the two diseases may have fundamentally similar cau the evolution of the arthropathy differing because immunologic factors which are not too well understo

The sedimentation rate of the erythrocytes was ge erally found to be a reliable index of active rheuma infection, but in an occasional case, in spite of a norm sedimentation time, the serial electrocardiograms co tinued to show significant alterations indicative active myocardial changes.

Tonsillectomy in childhood was observed not to l a deterrent to the subsequent development of a primar attack of rheumatic fever or of rheumatic recurrence In the section of population on which this report wa based the frequency of rheumatic fever as compare with that of scarlet fever was striking, even allowin for the relatively high degree of immunity young adul possess against scarlatina. The incidence of rheumati fever seemed to be higher in persons from families i which rheumatic infection had previously occurred, fact which supports the belief in a hereditary predi position to the disease. Because of this fact and be cause a close parallelism was found in this surve between the rising incidence of hemolytic streptococci infections of the respiratory tract and the incidence rheumatic fever, it was suggested that care shoul always be taken to exclude the possibility of a rhe matic infection in any child who comes from a rhe matic family and who is suffering from a hemolyti streptococcic infection of the respiratory tract or fro scarlet fever during the winter or spring months, espe cially in states where the disease is endemic. It wa emphasized that detection may not always be eas because arthritic manifestations are frequently insig nificant in children suffering from rheumatic fever an because of the more benign forms the cardiac involve ment is likely not to be severe enough to produce clinically recognizable cardiac enlargement, endocardia murmurs or a pericardial friction rub. It was there fore the recommendation of the author, in order t establish more valid concepts concerning the true inci dence, the seriousness and the prognosis of rheumati fever in its varying increments of severity, that elec trocardiograms, obtained either serially or after th administration of ergotamine tartrate, be employe routinely in all cases of hemolytic streptococcic infec tions of the upper part of the respiratory tract, espe cially during the winter and spring months.

DISCUSSION

LT. COL. IRVING WRIGHT (Medical Consultant, Sixth Service Command): This paper is interesting. Perhaps the most significant new note which is recognized is the reaction produced in the case of questionable carditis by the use of ergotamine. It may turn the doubtful diagnosis into a more decisive one and therefore be of considerable use in the treatment of rheumatic fever. Probably it will help also in following the course of the disease if one can determine when the reaction is no longer existent. Not infrequently

encounter in the army persons with a syndrome as which it is difficult to differentiate between rheutoid arthritis and rheumatic fever. I should like call attention to 200 cases of rheumatoid arthritis which after periods of months or years the PR erval became prolonged and in 24 per cent of which re developed iritis or pneumonia of a so-called rheutic fever type and other changes considered to be rt of the syndrome characteristic of rheumatic fever. Major Wendkos did not have time to discuss some cent observations in reference to treatment of this ndrome, and I thought some observations made in e army might be of interest. Penicillin would natully come to mind for serious trial, since it is specific r so many diseases in the streptococcic group. I ve had reports from the National Research Council, e Army Service Forces and the Army Air Force the use of penicillin in rheumatic fever. Unfortutely, the results have been so universaly unsatisfacry that orders have been issued which will effect a scontinuance of its use for this disease in the army spitals.

Salicylates have been given empirically for a long me, but more accurate data about their effects are coming available. In the first place, Brody and hers have been able to perfect a method by which e level of salicylic acid in the plasma can be meared. Thus the first step in removing salicylate erapy from the empiric field has been taken. There an error of less than 7 per cent in Brody's method. symptomatic treatment 3 to 6 Gm. of sodium salilate a day gave a blood level of 250 micrograms per bic centimeter. Massive doses, 10 to 20 Gm. a day, sulted in a blood level of 350 micrograms per cubic ntimeter. This result is being checked in a good any hospitals at present, but reports of Colburn's ork might be mentioned. In 19 of 43 patients treated ith 2 to 6 Gm. a day polycyclic rheumatic fever veloped; 16 of these had mitral stenosis. In other ords, all but 3 of these had mitral disease as a sidual. Eighteen patients, one half of whom gave evience of the presence of myocarditis on admission, were eated with 10 Gm. or more daily, and heart disease veloped in none of them. In addition to that rather gnificant finding, the general inflammatory reaction bsided more rapidly than with the former dosage. hese figures are striking, though the series is rather mall. In general, Colburn's work has stood the test time in other fields, and the army is giving his ndings serious consideration. In six months or a year e shall have a larger series and shall know whether not the preliminary results were reliable.

One other finding of significance comes from the ork of Link and his associates at the University of isconsin. They were able to produce hypoprothrombinemia in rabbits by salicylate therapy. Vitamin K rotected the animals against this effect. The work as been checked in human beings by Meyer, of Wisonsin, and Shapiro, of New York, and it is true that ven moderate doses produce moderate hypoprothrombinemia in human beings. No effect is noted on clotting in vitro. As early as fifty years ago Binz found hat the administration of salicylates produced tendenies toward bleeding. Certainly this fact has no great tatistical significance, because there have been many housands of cases of rheumatic fever in the army and he amount of salicylates given has been large, yet hemorrhage has been rare. Whether it is because the diet is adequate I do not know, but that seems likely. There will be isolated cases in which hemorrhagic manifestations occur. Vitamin K may be administered in these cases.

DR. STANLEY GIBSON: Major Wendkos' paper is most interesting. I was particularly struck with the frequency of electrocardiographic changes in the absence of clinical evidence of cardiac disease. It seems to me that the rheumatic picture as it is enountered among young men in the army is a somewhat different disease from that which is seen in children in civil life. Certainly I do see a high percentage of patients with definite and early physical signs of cardiac involvement. Often there is appreciable enlargement of the heart, together with significant murmurs which have not been present previously. Moreover, I have taken a good many electrocardiograms in my cases without finding nearly so high a percentage of abnormal electrocardiograms as Major Wendkos. Perhaps I have not taken them often enough or have been too liberal in my interpretation of the normal electrocardiogram. Doutbless I am missing a number of cases in which cardiac involvement is present; yet I have followed over a long period of years a number of children who had typical rheumatic arthritis but in whom no signs of cardiac disease have appeared during the years. It would seem to me that definite cardiac injury if permanent should have manifested itself at least in those who have been followed for ten or fifteen years.

MAJOR MARTIN WENDKOS: With reference to Dr. Gibson's discussion, we examined our patients daily, sometimes twice a day, for from thirty to sixty days; therefore, any opinion as to the presence or absence of a lesion was based on observations during that period. The reason I raised the question about possibly missing the diagnosis of rheumatic fever in the absence of a manifest endocardial lesion was that in surveys of school children cases were encountered in which no antecedent diagnosis of rheumatic fever had been made. From what we know of mitral stenosis, we feel that rheumatic fever is the cause in 99 per cent of the cases; therefore, it is my supposition that these children had rheumatic fever that escaped detection, and it is because of interest in the epidemiology and control of the disease that I stress these diagnostic factors, so that the true incidence may be more properly appraised.

I do not recommend that atropine be used routinely. I merely injected the drug to show that the electrocardiographic changes are the result of hypervagotonia. There were no ill effects from the drug, and it did not affect the course of the disease.

LT. COL. IRVING WRIGHT: I believe Colburn's work was all from the same series and was carefully controlled; it was done in the navy. I know Colburn well enough to know that he would do a well controlled study; it has appeared in several publications.

I should like to add that a great many cases of rheumatic fever are being missed. A review was made by cardiologists in each of five cities of 1,000 cases of persons who had been rejected for army service, and that group of experts decided that in 26 per cent of the cases rheumatic heart disease had not been diagnosed and there was no definite history of previous rheumatic fever.

Book Reviews

Air-Borne Infection; Some Observations on Its Decline. By Dwight O'Hara, M.D. Price, $1.50. Pp. 114, with 11 charts. New York: The Commonwealth Fund, 1943.

This small volume is an outstanding contribution to medical literature. It presents a thoughtful analysis and philosophic consideration of the history of air-borne infections in the commonwealth and state of Massachusetts. There are chapters on smallpox, diphtheria, the common cold, pneumonia, streptococcic infections, rheumatic fever and tuberculosis. The trends in mortality are studied in relation to all factors which may be considered to operate in the fields of preventive medicine, treatment of disease and public health. These include sanitation, standards of living, nutrition, isolation of foci of infection as in tuberculosis, treatment and specific immunizing measures. It is shown that in addition to all conscious efforts to control the diseases under discussion, there are probably other ameliorative factors, little understood at present, which are partly responsible for the decreases in mortality. This seems to be particularly true of measles and scarlet fever. The author is an enthusiastic supporter of measures for active immunization, except that in the case of scarlet fever he feels too much emphasis is put on only one aspect of the disease, the rash. He doubts the advisability of passive immunization except under exceptional circumstances or in a case of tetanus in which the patient has not been actively immunized. At the present time the best immunity to measles, mumps and chickenpox is obtained by having the disease in childhood. This immunity as well as immunity to other air-borne infections is probably kept up throughout life by the repetition of subclinical attacks. The last two chapters deal with the relationship of biologic inheritance, environment and the aging process to health and resistance to disease. The author reveals deep wisdom in his understanding and correlation of facts. The reviewer feels that this book could be read with interest by every member of the medical profession.

The Epidemiology of Rheumatic Fever and Some of Its Public Health Aspects. Written by John R. Paul, M.D., and other contributors for the American Heart Association. Second edition. Price, none given. Pp. 163, with 31 illustrations. New York: Metropolitan Life Insurance Company, 1943.

The author regards rheumatic fever as a specific disease, though he admits there are certain arguments against this assumption. One argument hinges on the relationship of rheumatic fever to streptococcic infections. Until the question of whether hemolytic streptococci are the only infectious agents in rheumatic fever has been answered, the concept of this condition as a clinical entity should not be discarded.

Midchildhood is the period of greatest susceptibility to first attacks, partly, in all probability, because of more frequent exposure to infection during this period.

The prevalence of rheumatic fever is determined by both environment and inherited tendencies. Among the environmental factors, climate, season and living conditions are important. Among the elements in living conditions which seem to be important are poverty, crowding and dampness. There is also good evide from a study of rheumatic families that there is inherited tendency toward the acquisition of rheum fever.

The author emphasizes the fact that public he programs have lagged behind other aspects of the st of this disease. Although many agencies have b interested, their efforts have not been coordinated. Fi of all, physicians, nurses and social workers must educated to the importance of the problem. Effo should then be centered on early recognition of disease and adequate care for those who have alre contracted it.

This excellent study deserves a wide reading amo students of rheumatic fever.

Micrurgical and Germ-Free Techniques; The Application to Experimental Biology a Medicine; a Symposium. Ed. 1. Edited James A. Reyniers. Price, $5.00. Pp. xiv and 2 with 94 illustrations and 17 tables. Springfield, Il Charles C Thomas, 1943.

Micrurgy is a basic technic adapted to the manipul tion and observation of microscopic objects, animate inanimate. With this definition, the first chapter of t symposium edited by James A. Reyniers begins description of this technic as it is applied, first, surface chemistry and the study of living cells, secon to botany, and then, with the development of the "germ free system," to the study of living animals, includi the mammalian fetus.

Much of the technical and even of the theoretic aspe of the problem is beyond the scope of interest of t average medical reader. However, the description the "germ-free" system as developed at Notre Dam by which animals may be reared for as long as s months under these conditions, is most interestin Such methods have been carefully and ingeniously planned and offer opportunities for the study of ma problems.

Of special interest to pediatricians is the applicati of the principles of the germ-free system to the contr of cross infections in hospitals and institutions in whi infants and children are cared for. The effective pri ciples are (1) air conditioning, (2) light barriers a (3) mechanical barriers. At the Cradle in Evanst Ill., units have been constructed and tested on the bas of these principles.

The Boy Sex Offender and His Later Career. B Dr. Lewis J. Doshay. Price, $3.50. Pp. 206, wi 40 tables and 12 diagrams. New York: Grune Stratton, Inc., 1943.

"This study was undertaken to investigate the sig nificance of early sex offenses among males for late life behavior, and in particular to determine to wha extent these Juveniles become a menace to socie through the commission of sexual or other offenses i adult years. The study also set itself to discover de termining factors in the background, personality an behavior of Juvenile sex delinquents that relate t success or failure in adult life, as criteria in the pre diction and treatment of similar cases."

The book presents conclusions drawn from a study the cases which appeared in the clinics of the Children's Court of New York over a period of six years. ere is a careful analysis of the factors in the home community and in the personalities of the parents ich might influence each case and a fairly complete dy of the personality of each offender.

Perhaps the most significant conclusion is that boys o are guilty of sexual offenses but who do not violate law in other ways do not commit sexual crimes en they grow up; those who commit both sexual other offenses present personality patterns which often bring them in conflict with the law during ulthood but not often for sexual offenses.

This book records the first detailed analysis of this oblem. It is well written and interesting throughout.

anual of Medical Services for Children in Planning For, During and After Evacuation. Prepared by the State Defense Council of Connecticut, with the cooperation of the State Department of Health. Price, 25 cents. Pp. 56. Hartford, Conn.: State Defense Council, 1942.

This manual gives instructions for the preparation, ndling and placement of children should evacuation om industrial centers become necessary. Among the usts" in preparation is the immunization of children smallpox, diphtheria and tetanus. Children who have ntagious diseases should be sent to locations handling ch patients rather than evacuated with the well chil-en. Special instructions are given for the care of wborn and premature infants. It is urged that chil-en with psychiatric difficulties be handled separately prevent the spread of neuroses. Food and medical pplies necessary for the care of children during evac-tion are listed.

The material is well organized, and the committees charge deserve credit for their careful thought and tention to detail.

he Compleat Pediatrician. By W. C. Davison. Fourth edition. Price, $3.75. Pp. 256. Durham, N. C.: Duke University Press, 1943.

The fourth edition of this well known textbook has en entirely revised and brought up to date as to eatment, and there are several additions. There is no increase in the total pages, however, for in this edition a bibliography has not been appended. This book becomes better and better; no physician who works with children should be without it.

State Programs for Care of Children with Rheumatic Fever Under the Social Security Act, Title V, Part 2. United States Department of Labor, Children's Bureau. Pp. 5, with no illustrations. Washington, D. C.: Superintendent of Documents, Government Printing Office, 1943.

In 1939 additional funds for the care of crippled children were authorized by Congress with the understanding that a portion of these funds be used for the care of children with rheumatic fever.

The typical program administered by a state agency for the care of crippled children serves at present only a small area, one to four counties. Children with heart disease or conditions leading to heart disease are referred to this agency by physicians, schools, hospitals and other institutions. A pediatrician acceptable to the American Board of Pediatrics is employed by the state, and consulting services are provided for social service. Nursing and educational needs are also met.

The Microscope and Its Use. By Francisco J. Muñoz in collaboration with Dr. Harry A. Charipper. Price, $2.50. Pp. 320, with 122 illustrations. Brooklyn, N. Y.: Chemical Publishing Co., Inc., 1943.

This is a technical book on the microscope in nontechnical language, written by a technical microscopic consultant and a professor of biology. There are chapters on the historical development, types, structure and use of simple and compound (both monocular and binocular), stereoscopic, metallurgic and polarizing microscopes and their accessories. The authors describe the various types of illumination and the adjustment of illuminating equipment and explain the common errors in the use of the microscope. There is a chapter on the use of the microtome, and a glossary and a bibliography are included. The book is well illustrated and written in essentially nontechnical language. It fills a need for an introduction to the use of the microscope for any one who must use this instrument without thorough instruction in all the finer details of its adjustment.

News and Comment

PERSONAL NEWS

Sabbatical Leave for Dr. Henry J. Gerstenerger.—Dr. Henry J. Gerstenberger is taking a year's bbatical leave beginning Aug. 28, 1944, the date on hich the school year of the Western Reserve Uniersity School of Medicine began. Dr. John A. Toomey as been appointed acting head of the department of ediatrics at the School of Medicine and acting director f pediatrics at the University Hospitals and at the City ospital, Cleveland, institutions affiliated with the chool of Medicine.

Dr. Gerstenberger will use his leave in writing a hisory of the Babies and Childrens Hospital of Cleveland nd also a history of the development of preventive edicine and social medicine (the infant and child welfare and the antituberculosis movement) in Greater Cleveland.

GENERAL NEWS

American Board of Pediatrics.—Examinations by the American Board of Pediatrics, Inc., will be held on the following dates: March 2, 1945, a written examination, locally, under a monitor, for all physicians planning to take the oral examination in the spring; April 14 or 15, 1945, an oral examination in New York; May 19 or 20, 1945, an oral examination in Chicago.

The deadline for applications for the first two examinations is Dec. 15, 1944; for the oral examination in Chicago, Jan. 19, 1945.

No more applications for fall examinations can be accepted.

Directory of Pediatric Societies *

INTERNATIONAL

International Association of Preventive Pediatrics

President: Prof. S. Monrad, Dronning Louises Børnehospital, Copenhagen, Denmark.
Secretary: Dr. Daniel Oltramare, 15 Rue Lévrier, Geneva, Switzerland.

International Congress of Pediatrics

President: Dr. Henry F. Helmholz, Mayo Clinic, Rochester, Minn.
Secretary-Treasurer: Dr. Charles F. McKhann, University Hospital, Ann Arbor, Mich.
Canadian Committee:
Chairman: Dr. Alan Brown, Hospital for Sick Children, 67 College St., Toronto.
Secretary: Dr. H. P. Wright, 1509 Sherbrooke St. W., Montreal.
Place: Boston. Time: Postponed indefinitely.

International Congress for the Protection of Infancy

Secretary: Prof. G. B. Allaria, Corso Bramante 29, Torino 120, Italy.

FOREIGN

Argentine Pediatric Society of Buenos Aires

President: Dr. Martin Ramón Arana, 1809 Rodriguez Peña, Buenos Aires.
General Secretary: Dr. Alfredo Larguia, Cerrito 1179, Buenos Aires.

Associação Paulista de Medicina, Section on Pediatrics

President: Dr. Vicente Lara.
First Secretary: Dr. Armando de Arruda Sampaio.
Second Secretary: Dr. Paulo de Barros Franca, Av. Brigadeiro Luiz Antonio 393, 1° Andar, São Paulo, Brazil.

British Paediatric Association

President: Prof. L. G. Parsons, 58 Calthorpe Rd., Five Ways, Birmingham.
Secretary: Dr. Donald Paterson, 27 Devonshire Pl., London, W. 1.

Danish Pediatric Society

President: Dr. E. Lenstrup, Copenhagen.
Secretary: Dr. E. Gjørup, Dronning Louises Børnehospital, Copenhagen.

Nederlandische Vereeniging voor Kindergeneeskunde

President: Dr. J. H. G. Carstens, Servaasbolwerk 14ª, Utrecht.
Secretary: Dr. R. P. van de Kasteele, Laan van Poot 340, 's Gravenhage.
Place: Different places. Time: Three times a year.

Paediatrický Spolok na Slovensku

President: Dr. A. J. C. Chura, Lazaretská 11, Bratislava.
Secretary: Dr. P. Rados, Lazaretská 6, Bratislava.
Place: Pediatric Clinic, University Bratislava. Time: Six times a year.

Royal Society of Medicine, Section for the Study of Disease in Children

President: Dr. E. A. Cockayne, 98 Harley St., Lond W. 1, England.
Secretary: Dr. R. Lightwood, 86 Brook St., Lond W. 1, England.
Place: 1 Wimpole St., London. Time: Fourth Fri of each month, 4:15 p. m.

Palestine Jewish Medical Association, Section of Physicians of Children's Diseases

President: Prof. S. Rosenbaum, 26 Bialkstr., Tel Av
Secretary: Dr. A. Brünn, 9 Maazestre, Tel Aviv.

Sociedad Cubana de Pediatria

President: Dr. Angel A. Aballí Arellano, 17 No. Vedado, Habana.
Secretary: Dr. Julio G. Cabrera Calderin, Hospi Mercedes L y 21 (Vedado), Box 2430, Habana.
Place: Cátedra de Clinica Infantil, Hospital Mercede Habana. Time: Last Wednesday of every month.

Sociedad Mexicana de Pediatria

President: Dr. Fernando López Clares, 12/a. Medel 191, Mexico.
Secretary: Dr. Jesus Gómez Pagola, Versalles Mexico.

Sociedad Venezolana de Puericultura y Pediatr

President: Dr. E. Santos Mendoza.
Secretary: Dr. P. Oropeza, Hospital de Niños, Carac

Société de Pédiatrie de Paris

President: Dr. B. Weill-Hallé, 49 Avenue Raymo Poincare, Paris, France.
Secretary: Dr. Jean Hallé, 10 bis Rue Pré aux Cler Paris, France.
Place: Hôpital des Enfants Malades, 49 Rue de Sèvr Time: 4:30 p. m., third Thursday of every month.

Uruguyan Society of Pediatrics

President: Dr. Jose Alberto Praderi, Eduardo Acev 1132, Montevideo.
Secretary: Dr. Alfredo Ramon Guerra, Paysandú 8 Montevideo.

NATIONAL

American Medical Association, Scientific Assembly, Section on Pediatrics

Chairman: Dr. John Aikman, 184 Alexander S Rochester, N. Y.
Secretary: Dr. Gilbert J. Levy, 188 S. Bellevue Blv Memphis, Tenn.

American Academy of Pediatrics

President: Dr. Franklin P. Gengenbach, 1850 Gilp St., Denver, Colo.
Secretary: Dr. Clifford G. Grulee, 636 Church S Evanston, Ill.

* Secretaries of societies are requested to furnish the information necessary to make this list complete and to keep it up to date.

AMERICAN HOSPITAL ASSOCIATION, CHILDREN'S HOSPITAL SECTION

irman: Dr. Joelle C. Hiebert, 299 Main St., Lewis-, Maine.
tary: Dr. W. Franklin Wood, McLean Hospital, averly, Mass.

AMERICAN PEDIATRIC SOCIETY

ident: Dr. James L. Gamble, 300 Longwood Ave., oston.
etary-Treasurer: Dr. Hugh McCulloch, 325 N. clid Ave., St. Louis.

CANADIAN SOCIETY FOR THE STUDY OF DISEASES OF CHILDREN

ident: Dr. R. R. Struthers, 906 Drummond Med- l Bldg., Montreal.
etary-Treasurer: Dr. Elizabeth Chant Robertson, ospital for Sick Children, Toronto.

SOCIETY FOR PEDIATRIC RESEARCH

ident: Dr. Joseph A. Johnston, Henry Ford Hos- tal, Detroit.
etary: Dr. Mitchell I. Rubin, 1740 Bainbridge St., hiladelphia.

SECTIONAL

INTERMOUNTAIN PEDIATRIC SOCIETY

sident: Dr. Eugene Smith, 385–24th St., Ogden, tah.
etary-Treasurer: Dr. W. C. Cheney, 837 Boston dg., Salt Lake City.
e: Salt Lake City General Hospital. Time: First hursday of each month, 8 p. m.

NEW ENGLAND PEDIATRIC SOCIETY

sident: Dr. Warren R. Sisson, 319 Longwood Ave., oston.
retary-Treasurer: Dr. James Marvin Baty, 1101 eacon St., Brookline, Mass.
e: Boston Medical Library. Time: Four meetings year, occurring from September to May.

NORTH PACIFIC PEDIATRIC SOCIETY

sident: Dr. M. L. Bridgeman, 1020 S. W. Taylor t., Portland, Ore.
retary: Dr. C. G. Ashley, 833 S. W. 11th Ave., ortland, Ore.

NORTHWESTERN PEDIATRIC SOCIETY

sident: Dr. Arild E. Hansen, University of Minne- ota, Minneapolis.
retary-Treasurer: Dr. Albert V. Stoesser, 205 W. niversity Hospital, Minneapolis.
e: Minneapolis, St. Paul, Duluth and Rochester. ime: January, April, July and October.

ROCKY MOUNTAIN PEDIATRIC SOCIETY

sident: Dr. G. R. Fisher, 23 E. Pikes Peak Ave., olorado Springs, Colo.
retary: Dr. Joseph H. Lyday, 1850 Gilpin St., enver.

SOUTHERN MEDICAL ASSOCIATION, SECTION OF PEDIATRICS

airman: Dr. William Weston Jr., 1428 Lady St., olumbia, S. C.
retary. Dr. Angus McBryde 604 W. Chapel Hill St., Durham, N. C.

STATE

ALABAMA PEDIATRIC SOCIETY

President: Dr. Amas Gipson, 948 Forrest Ave., Gadsen.
Secretary-Treasurer: Dr. Ruth Berrey, 2021–6th Ave. N., Birmingham.

ARIZONA PEDIATRIC SOCIETY

President: Dr. Vivian Tappan, San Clemente, Tucson.
Secretary: Dr. Hilda Kroeger, Arizona State Health Dept. (Maternal and Child Welfare Division), Phoenix.

ARKANSAS STATE PEDIATRIC ASSOCIATION

Chairman: Dr. C. B. Billingsley, 1425 N. 11th St., Fort Smith.
Secretary: Dr. R. E. Weddington, 1425 N. 11th St., Fort Smith.

CALIFORNIA STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

Chairman: Dr. William C. Deamer, University of California Hospital, San Francisco.
Secretary: Dr. Charles W. Leach, 2000 Van Ness Ave., San Francisco.

FLORIDA STATE PEDIATRIC SOCIETY

President: Dr. Ludo Von Meysenbug, Box 3356, Daytona Beach.
Secretary: Dr. Robert Blessing, 409 Blount Bldg., Ft. Lauderdale.
Place: Concurrent with state association meeting at time of convention.

GEORGIA PEDIATRIC SOCIETY

President: Dr. T. F. Davenport, 104 Ponce de Leon Ave. N. E., Atlanta.
Secretary-Treasurer: Dr. Don F. Cathcart, 478 Peachtree St. N. E., Atlanta.

HEZEKIAH BEARDSLEY PEDIATRIC CLUB OF CONNECTICUT

President: Dr. Edward T. Wakeman, 129 Whitney Ave., New Haven.
Secretary: Dr. Herman Yannet, Southbury Training School, Southbury.
Time: Three meetings a year.

ILLINOIS STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

Chairman: Dr. Craig D. Butler, 715 Lake St., Oak Park.
Secretary: Dr. A. J. Fletcher, 139 N. Vermilion, Danville.

INDIANA STATE PEDIATRIC SOCIETY

President: Dr. K. T. Knode, 1105 E. Jefferson Bldg., South Bend.
Secretary-Treasurer: Dr. Mathew Winters, 621 Hume Mansur Bldg., Indianapolis.
Time: Two meetings a year.

IOWA PEDIATRIC SOCIETY

President: Dr. Mark L. Floyd, Children's Hospital, Iowa City.
Secretary-Treasurer: Dr. James Dunn, Davenport Bank Bldg., Davenport.

MEDICAL SOCIETY OF STATE OF NEW YORK, SECTION ON PEDIATRICS

Chairman: Dr. A. Clement Silverman, 608 E. Genesee St., Syracuse.
Secretary: Dr. Albert G. Davis, 307 Gas and Electric Bldg., Utica.

MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA, PEDIATRIC SECTION

Chairman: Dr. Elwood W. Stitzel, 403 Central Trust Bldg., Altoona, Pa.
Secretary: Dr. P. F. Lucchesi, Philadelphia Hospital, Philadelphia.

MICHIGAN STATE MEDICAL SOCIETY, PEDIATRIC SECTION

Chairman: Dr. Charles F. McKhann, University Hospital, Ann Arbor.
Secretary: Dr. Mark F. Osterlin, Central Michigan Children's Clinic, Traverse City.

MISSISSIPPI STATE PEDIATRIC SOCIETY

President: Dr. Harvey F. Garrison Jr., 315 E. Capitol Pl., Jackson.
Secretary: Dr. Guy Verner, 126 N. Congress St., Jackson.

NEBRASKA PEDIATRIC SOCIETY

President: Dr. E. W. Hancock, 820 Sharp Bldg., Lincoln.
Secretary-Treasurer: Dr. John M. Thomas, 1102 Medical Arts Bldg., Omaha.
Place: As announced by committee. Time: Third Thursday of each month from October to June, inclusive. Dinner at 6 p. m.

NEW HAMPSHIRE PEDIATRIC SOCIETY

President: Dr. MacLean J. Gill, 14 N. State St., Concord.
Secretary-Treasurer: Dr. Ursula G. Sanders, 46 Pleasant St., Concord.
Time: Twice yearly.

NORTH CAROLINA PEDIATRIC SOCIETY

President: Dr. Arthur H. London, 1105 W. Main St., Durham.
Secretary: Dr. Jay M. Arena, 604 W. Chapel Hill St., Durham.

OKLAHOMA STATE PEDIATRIC SOCIETY

President: Dr. Ben H. Nicholson, 301 N. W. 12th St., Oklahoma City.
Secretary: Dr. Luvern Hays, 108 W. 6th St., Tulsa.
Place: Oklahoma Club. Time: 6:30 p. m., fourth Friday of each alternate month from September to May, inclusive.

SOUTH CAROLINA PEDIATRIC SOCIETY

President: Dr. Lonita Boggs, 301 E. Coffee St., Greenville.
Secretary-Treasurer: Dr. Hilla Sheriff, Wade Hampton Office Bldg., Columbia.

TEXAS PEDIATRIC SOCIETY

President: Dr. F. H. Lancaster, 4409 Fannin St., Houston.
Secretary-Treasurer: Dr. John E. Ashby, 3610 Fairmount Ave., Dallas.

VIRGINIA PEDIATRIC SOCIETY

President: Dr. Edwin A. Harper, 301 Rivermont Ave., Lynchburg.
Secretary: Dr. Emily Gardner, 1100 W. Franklin St., Richmond.

WEST VIRGINIA STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

President: Dr. Andrew Amick, 1021 Quarrier, Charleston.
Secretary: Dr. A. A. Shawkey, Professional B, Charleston.

LOCAL

ACADEMY OF MEDICINE OF CLEVELAND PEDIATRIC SECTION

Chairman: Dr. J. D. Nourse, 10515 Carnegie A, Cleveland.
Secretary: Dr. I. B. Silber, 10465 Carnegie A, Cleveland.
Place: Cleveland Medical Library Bldg. Time: tober, December, February and April.

ACADEMY OF MEDICINE, TORONTO, SECTION OF PEDIATRICS

President: Dr. I. Nelles Silverthorne, 170 St. G St., Toronto, Canada.
Secretary: Dr. G. P. Hamblin, 2333 Bloor St. Toronto, Canada.

BRONX PEDIATRIC SOCIETY

President: Dr. Harry J. Cohen, 1975 Walton A New York.
Secretary: Dr. Walter Levy, 12 E. 88th St., New Y
Place: Concourse Plaza Hotel, 161st St., and G Concourse. Time: Second Wednesday of each m except June, July, August and September.

BROOKLYN ACADEMY OF PEDIATRICS

President: Dr. Harry A. Naumer, 37–8th A Brooklyn.
Secretary: Dr. Lewis A. Koch, 62 Pierrepont Brooklyn.
Place: Granada Hotel. Time: Fourth Wednesda October, November, February, March and April.

BUFFALO PEDIATRIC SOCIETY

President: Dr. A. Wilmot Jacobsen, 187 Bryant Buffalo N. Y.
Secretary: Dr. Richard A. Downey, 786 Forest A Buffalo, N. Y.
Place: Children's Hospital, 219 Bryant St. Time: p. m., first Monday of each month from Septe to June.

CENTRAL NEW YORK PEDIATRIC CLUB

President: Dr. Edward J. Wynkoop, 501 James Syracuse.
Secretary: Dr. Frank J. Williams, 58 S. Swan Albany.
Places:: Various cities in New York. Time: T Tuesday of April and September.

CHICAGO PEDIATRIC SOCIETY

President: Dr. Morley D. McNeal, 2 N. Sheridan Highland Park, Ill.
Secretary: Dr. Henry G. Poncher, 1819 W. Polk Chicago.
Place: Children's Memorial Hospital, 710 Fulle Ave. Time: Third Tuesday of each month, Oct to May, Inclusive.

Cincinnati Pediatric Society

etary: Dr. T. Selkirk, 3530 Reading Rd., Cincinnati.
e: Children's Hospital, Elland Ave., Cincinnati.
me: On call.

ident: Dr. Lloyd K. Felter, 3144 Jefferson Ave., ncinnati.

Dallas Pediatric Society

ident: Dr. John E. Ashby, 3610 Fairmount Ave., llas, Texas.
etary-Treasurer: Dr. Gladys J. Fashena, 4585 Bel-rt, Dallas, Texas.
e: Bradford Baby Hospital. Time: 1 p. m., second d fourth Saturdays of each month.

Detroit Pediatric Society

ident: Dr. John J. Pollack, 650 Maccabees Bldg., etroit, Mich.
etary: Dr. Philip J. Howard, 2799 W. Grand Blvd., Detroit, Mich.
e: Wayne County Medical Society. Time: 8:30 m., first Wednesday of each month from October June, inclusive.

Fulton County Medical Society, Pediatrics Section (Atlanta, Ga.)

irman: Dr. Don F. Cathcart, 478 Peachtree St. E., Atlanta.
etary: Dr. Harry Lange, 478 Peachtree St., N. E., tlanta.
e: Academy of Medicine, 38 Prescott St. N. E. ime: Second Thursday of each month from October April, 8 p. m.

Houston Pediatric Society

ident: Dr. Raymond Cohen, 2300 Caroline St., ouston, Texas.
etary: Dr. Betty Moody, 526 Richmond Rd., ouston, Texas.
e: College Inn, Houston. Time: Fourth Monday each month.

Kansas City (Missouri) Pediatric Society

ident: Dr. Edwin H. Schorer, 1103 Grand Ave., ansas City.
etary: Dr. H. E. Petersen, Kirkpatrick Bldg., St. oseph, Mo.
e: Kansas City General Hospital. Time: On call.

Los Angeles County Medical Association, Pediatric Section

ident: Dr. Oscar Reiss, 2200 W. 3d St., Los ngeles.
etary-Treasurer: Dr. Elena Boder, 1830½ Lucille ve., Los Angeles.
e: Los Angeles County Medical Headquarters, 1925 ilshire Blvd. Time: Second Monday of February, pril, June, October and December.

Medical Society of the County of Kings and the Academy of Medicine of Brooklyn, Pediatric Section

ident: Dr. Abraham M. Litvak, 1145 Eastern Park-ay, Brooklyn.
etary: Dr. Harold Levy, 750 St. Marks Ave., rooklyn.
e: 1313 Bedford Ave., Brooklyn. Time: 9:00 p. m., ourth Monday of each month, October to April, clusive.

Medical Society of the County of Queens, Inc., Section on Pediatrics

Chairman: Dr. Meyeron Coe, 217-02-91st Ave., Queens Village, N. Y.
Secretary-Treasurer: Dr. Edith A. Mittell, 144-38th Ave., Flushing, N. Y.
Place: Queens County Medical Bldg., Forest Hills, N. Y. Time: Third Monday of October, January, March and May.

Medical Society of the District of Columbia, Section on Pediatrics

President: Dr. Harry A. Spigel, 2647 Connecticut Ave., Washington, D. C.
Secretary-Treasurer: Dr. Perry W. Gard, 2520 Woodley Rd., Washington, D. C.
Place: Medical Society Bldg., 1718 M St. N. W. Time: 8 p. m., fourth Thursday of every month.

Memphis Pediatric Society

President: Dr. F. T. Mitchell, 376 S. Bellevue Ave., Memphis, Tenn.
Secretary-Treasurer: Dr. Harry Jacobson, 1193 Madison Ave., Memphis, Tenn.
Place: John Gaston Hospital. Time: Quarterly.

Milwaukee Pediatric Society

President: Dr. John H. Reynolds, 1628 W. Wisconsin Ave., Milwaukee.
Secretary-Treasurer: Dr. F. J. Mellencamp, 324 E. Wisconsin Ave., Milwaukee.
Place: Milwaukee Athletic Club. Time: Second Wednesday of each alternate month, beginning with February.

New York Academy of Medicine, Section of Pediatrics

Chairman: Dr. Howard Craig, 175 E. 79th St., New York.
Secretary: Dr. Alfred E. Fischer, 73 E. 90th St., New York.
Place: New York Academy of Medicine, 2 E. 103d St. Time: Second Thursday of each month from October to May, inclusive, 8:30 p. m.

Northern California Affiliates

President: Dr. Crawford Bost, 400 Post St., San Francisco.
Secretary: Dr. William A. Reilly, 384 Post St., San Francisco.
Time: Second Thursday of September, November, January, March and May.

Oklahoma City Pediatric Society

President: Dr. William M. Taylor, 1200 N. Walker St., Oklahoma City.
Secretary: Dr. G. R. Felts, 625 N. W. 10th St., Oklahoma City.
Place: Oklahoma Club. Time: Third Thursday of each month.

Philadelphia Pediatric Society

President: Dr. Carl Fischer, Greene and Coulter Sts., Germantown, Philadelphia.
Secretary: Dr. Sherman Little, 1740 Bainbridge St., Philadelphia.
Place: College of Physicians, 19 S. 22d St. Time: Second Tuesday in January, March, May and November.

Pittsburgh Pediatric Society

President: Dr. John D. Sturgeon Jr., 22 N. Gallatin Ave., Uniontown, Pa.

Secretary-Treasurer: Dr. C. J. Stoecklein, Medical Arts Bldg., Pittsburgh.

Place: Pittsburgh Academy of Medicine. Time: Second Friday, alternate month from October to June, inclusive.

Richmond Pediatric Society

President: Dr. Stanley Meade, 913 Floyd Ave., Richmond, Va.

Secretary-Treasurer: Dr. Louise Galvin, 214 S. Boulevard, Richmond, Va.

Place: Richmond Academy of Medicine, 1200 E. Clay St. Time: 8 p. m., third Thursday of each month, except June, July and August.

Rochester Pediatric Society

President: Dr. Herbert Soule, 122 Rutgers St., Rochester, N. Y.

Secretary-Treasurer: Dr. Jerome Glaser, 300 S. Goodman St., Rochester, N. Y.

Place: Rochester Academy of Medicine or arrangement by program committee. Time: Third Friday of each month from October to May.

St. Louis Pediatric Society

President: Dr. Jerome Diamond, 508 N. Grand Ave., St. Louis.

Secretary-Treasurer: Dr. Mary A. McLoon, 408 Humboldt Bldg., St. Louis.

Place: St. Louis Medical Society Bldg. Time: First Friday of each month from November to June.

Seattle Pediatric Society

President: Dr. Frederick B. Joy, Stimson Bldg., S
Secretary: Dr. Sherod M. Billington, Medical
Bldg., Seattle.

Place: College Club. Time: Third Friday o
month from September to June at 6:30 p. m.

Southwestern Pediatric Society

President: Dr. Jeanette Harrison, 1136 W. 6th
Los Angeles.

Secretary: Dr. Henry F. Gallagher, 1930 W
Blvd., Los Angeles.

Place: Jonathan Club of Los Angeles. Time:
Wednesday in January, March, May, Septembe
November.

University of Michigan Pediatric and Infe
tious Disease Society

President: Dr. Campbell Harvey, 35 W. Huron
Pontiac, Mich.

Secretary: Dr. Harry A. Towsley, University of M
igan, Department of Pediatrics and Communi
Diseases, Ann Arbor, Mich.

Westchester County Medical Society, Pediat
Section (New York)

President: Dr. John B. Ahouse, 27 Ludlow St., Yon
N. Y.

Secretary-Treasurer: Dr. Elvira Ostlund, 64 High
Rd., Rye, N. Y.

Place: Grasslands Hospital, Valhalla, N. Y. T
Third Thursday in October, December, February
April.